APRIL 1936

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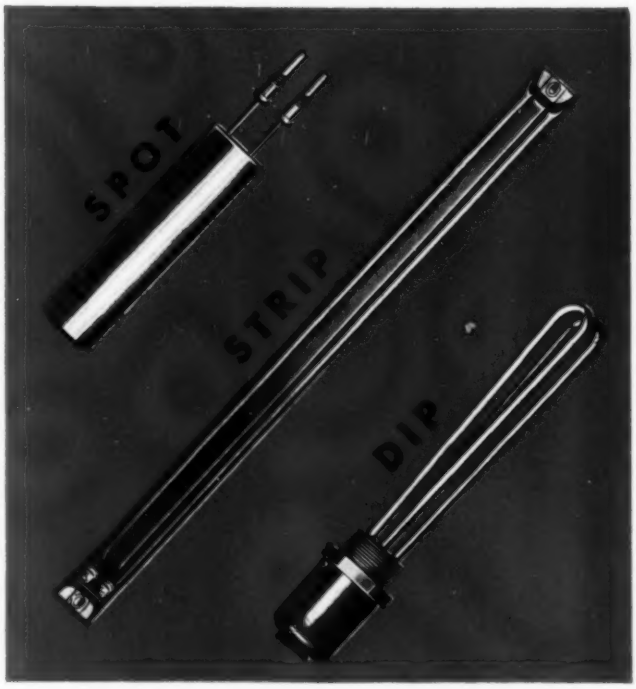

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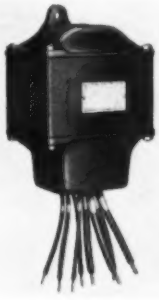

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160-36

GENERAL ELECTRIC

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ELECTRICAL CONTRACTORS
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and others engaged in the business of electrical construction

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EC
APRIL 1936

Service

WHILE the primary function of a business paper such as ELECTRICAL CONTRACTING is to build for its subscribers a publication of widest interest to its field, there is another side to its service that is indicative of the depth to which that paper has its roots in its industry, and that is the extent to which its readers, advertisers and others look to it for information and help.

EVERY week brings numerous requests for help. Perhaps it's the name of a manufacturer of some product, or it may be that a reader has an old device to repair and needs some parts. Another question has to do with forms for estimating, contracts, work orders, etc. Many people ask us to recommend books on various subjects relating to the business; others ask our advice about schools both for themselves and for their boys. Any number of questions come in about the Code and about practical wiring problems. Local associations and leagues ask us to help them plan programs and make suggestions.

AMONG other things we have a photograph file covering a large number of subjects in our field. Last year more than a dozen shows drew upon our files for illustrations to use in displays. This file is also frequently used by manufacturers, associations and others when creating booklets.

ANOTHER phase of our information service is the furnishing of market data to manufacturers selling in our field. For years we have been gathering pertinent information relative to how electrical contractors buy and sell. Because of the position of confidence and respect that we have built up over the years, it is possible for us to get in confidence information that the contractors would be reluctant to give others.

AND then there are miscellaneous other kinds of service that we are expected to render such as addressing meetings, advising people on the conduct of their business, making suggestions with respect to local trade problems, serving on committees, helping inventors find a manufacturer, advising on the marketability of a new product, etc., etc., etc.

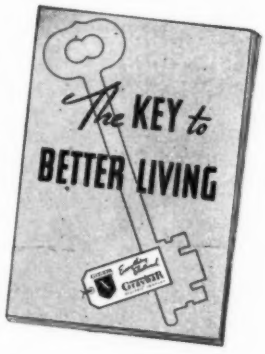
IT is such extra services that a magazine is called upon to perform only when it is accepted by its field. They show the fundamental soundness of the publication.

Reprinted Courtesy of College Humor

"It's like this every morning. Why don't you cook breakfast in the kitchen?"

Is there an electrical contractor in the audience?

The not-so-happy home pictured above looks like a good prospect for a complete re-wiring job. No doubt about it. ¶ The question is, however—how is the Electrical Contractor going to reach homes like this effectively. How is he going to sell modern wiring to prospects whose understanding of practical electricity may be very limited? *What* should he sell? ¶ In way of an answer... to help progressive Electrical Contractors sell electrical *convenience*... Graybar has prepared a comprehensive 16 page booklet—"The Key to Better Living." You'll want to see it... your prospective customers will want to see it. It tells everything! Furthermore, we have a plan for distributing imprinted copies... Mail this coupon—today!



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ELECTRICAL CONTRACTING

Vol. 35 APRIL, 1936 No. 6

▲

S. B. Williams, Editor

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FIELD BRIEFS

● INSULATED WIRE 436,000 miles long, long enough to encircle the earth at the equator seventeen and one-half times was tested in 1935 by Underwriters' Laboratories. This included 286,000 miles of rubber-covered wire, 111,000 miles of 2-wire flexible cord, 23,200 miles of heater cord, and 15,850 miles of fixture wire.

● RED SEAL WIRING promotion is again being pushed in several cities that had allowed it to lapse during the low building period. In Northern California the Pacific Gas & Electric's 150 field salesmen will promote Red Seal for all new homes constructed in that area.

● JUST TO INDICATE what is needed to maintain a reasonably complete stock of service shop parts, the Wm. C. Krauth Electric Company, Louisville, Ky., carries 600 sizes of brushes, 138 sizes of bronze bearings from 3/16-in. to 3½-in. bore, 380 bins and drawers, and a repair parts inventory of about $6,000. Parts data is so voluminous that seven special loose leaf binders are kept up to date for office reference.

● THE HIGHEST AVERAGE annual residential customer consumption goes to the state of Washington with 1,104 kw.-hr., according to a survey by the Federal Power Commission and the lowest to New Hampshire with 450 kw.-hr. The report also points out a trend to higher rates in smaller communities. The average annual revenue per kw.-hr. ranges from a low of 2.7 cents in Washington to a high of 8 cents in Louisiana.

● A NUMBER of the Louisville, Ky. motor service shops have a minimum service call charge of $1.50, which is also the regular hourly rate.

● RED SEAL AWARDS in Philadelphia last year increased 33 per cent to a total of 440 certificates and actually adding 5,657 outlets to the wiring.

● A PERMANENT EXHIBIT to be used by inspectors at county fairs and other public gatherings to explain the hazards of improper installation is being planned by the Southern California Chapter of Inspectors.

● REINSPECTIONS of the entire fire zone of Birmingham (Ala.) after the disastrous fire of February 1934 was made by the insurance rating bureau, says John D. Turner, executive secretary of the local N.E.C.A. chapter. With hard-pressed taxpayers in opposition, little re-wiring was done. "But there will soon come a day," says Turner, "because all those reinspection records are carefully filed in a safe place for action."

● DEFECTIVE WIRING, according to the annual report of the Kansas City Fire Department, caused 130 fires in 1935, as compared with 147 fires in 1934, a decrease of 11.5 per cent. Fires from all causes decreased 33 per cent in number during the year.

1

Moisture-Protected Brewery Wiring

PRACTICAL installation methods to resist the ravages of moisture to reduce maintenance expense and to minimize shut-downs were employed in completely rewiring the John F. Trommer, Inc., brewery at Orange, N. J., during its recent modernization. Special consideration was given to differences in temperatures between adjoining areas, to corrosion from overhead drippage, to condensation within conduits, dampness in panelboards, heavy steam vapors, and shock hazards from portable electrical equipment to be operated in damp places. Because the entire plant was re-arranged to accommodate the newest types of brewery equipment, it was possible for the Edward J. White Co., Newark, N. J., which installed the new wiring system, to provide racks, supports and enclosures of long life, and to route the various runs to permit effective sealing or drainage of conduits in accordance with the atmospheric conditions of each area. No attempt was made by the owners to economize in the installation, because engineers connected with the brewery had already gained a wide knowledge of maintenance costs in operating another plant.

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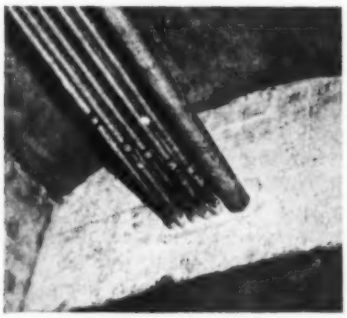

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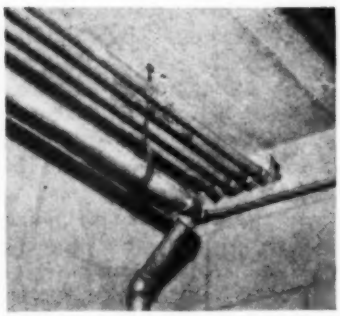

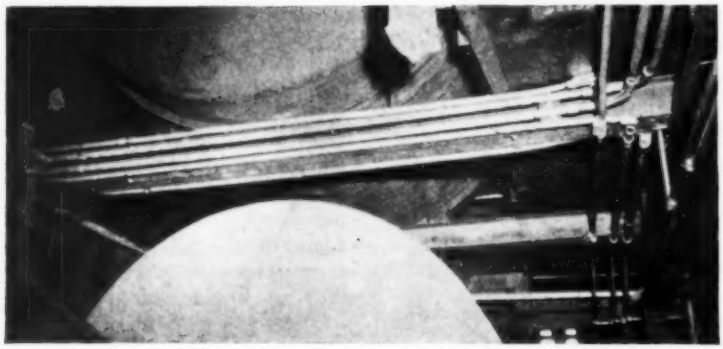

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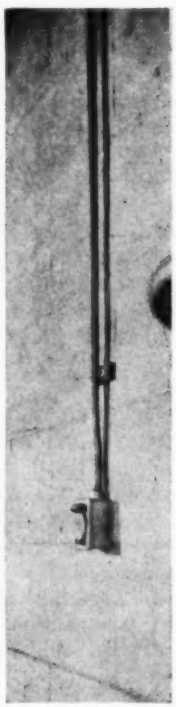

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1. The battle against moisture began with the main switchboard and generator leads. This gallery board has an overhead drip hood and all feeders run upward with the main pull box "high and dry" under the gallery floor. The generator feeders, three 4-in., were run horizontally around the wall to the right and were sloped downward with a drain into the generator cable pit.

2. Where the five 2-in. power feeder conduits leave the generator room at the ceiling and enter a cold room beyond, they are equipped with sealing fittings and thoroughly compounded, while the 4-in. conduit received similar treatment on the opposite side.

3. A group of 1¼-in. conduit feeders leading to a cold room, equipped with sealing fittings placed to leave the compounding hubs accessible after this wall opening has been cemented shut.

4. One of the tank room areas. Here all the conduit was run exposed. Each run was carefully sloped to drain toward ½-in. "bleed" or drain holes that were drilled in the bodies of the threaded conduit fittings. In some places short pieces of horizontal conduit was bent into a saddle under beams or other piping. In such cases drain holes were provided in the conduit at its low point.

5. Lighting conduits in the troublesome areas were also provided with free drainage and "breathing" holes at drilled fittings. Here three ¾-in. and one 1-in. conduit are bolted to a ½-in. by 2-in. flat iron spacer. This maintains a ½-in. clear space between the conduit and the moist walls.

6. A typical wall outlet stub-down, with ½-in. thick iron blocks to maintain a free space between the masonry and conduit. Brass machine screws and standard expansion shields were employed to support the conduit clamps and spacer blocks.

7. Cabinets were blocked out to prevent contact with damp walls by means of ½-in. flat iron placed at four points.

8. Because all lighting and power panelboards were provided with solid hot-dipped galvanized steel drip shields, all conduits were taken from the side walls.

9. Various starter groups in the brew house were located near equipment that would be hosed down frequently. The starter racks were therefore provided with solid sheet steel splash protection panels upon which the starters were mounted beside their hot-dipped galvanized enclosed safety switches. To reduce possible floor seepage the feeder conduits were routed through one floor slot.

This entire plant is wired with rigid iron conduit, using galvanized threaded fittings at all points including where lock-nut-bushing connections were made at panelboards, control devices and large junction boxes. Particular care was used to make up butted conduits at elbows and couplings, and assemble all pieces of conduit to avoid exposed threads. All threaded joints were thoroughly sealed with red lead during their make up. Such exposed threads as occurred at cabinets were given a careful prime coat. Final painting will be done by others.

Drainage and Sealing

Conduits were spaced away from all wall and ceiling surfaces to allow free air circulation between, and to make it easier to paint all piping as a regular maintenance policy of the plant. In all areas where conditions might cause moisture to form within the conduit, the conduit runs were sloped to drain to a "bleed" hole. These bleed holes were about ⅛-in. diameter, and usually occurred in L-type or outlet fittings. In some runs that required saddles or double off-sets, a drain hole was drilled in the bottom wall of the conduit itself. To avoid sharp burrs at these drilled holes, a flat-sharpened drill was used, similar to a slate-drilling bit.

At each wall or floor which separated areas of different operating temperatures the conduit runs were provided with threaded seal-off fittings. These fittings were filled with compound as recommended by the fittings manufacturers. The sealed fittings prevent circulation of warm, moist air through conduit runs which otherwise would lead to condensation in the runs when passing through the cooler rooms. Because of the many bleed holes provided in such cooler areas, a free circulation of air is possible within the conduits in a given area preventing any tendency to produce a low pressure between adjoining areas that otherwise might result from a partial vacuum.

Some of the rooms were completely equipped with vapor-proof fittings and lighting fixtures. In such areas no bleed holes were drilled, because the exclusion of steam vapor was most important. In all areas, excepting those of reasonable dryness, the lighting fixture suspension fittings were caulked and compounded at the point of connection of the conduit system. The compound was installed with the fix-

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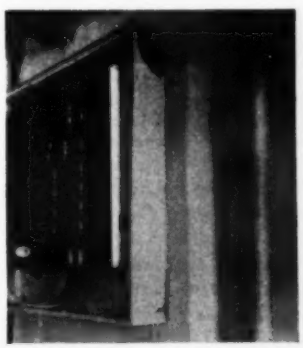

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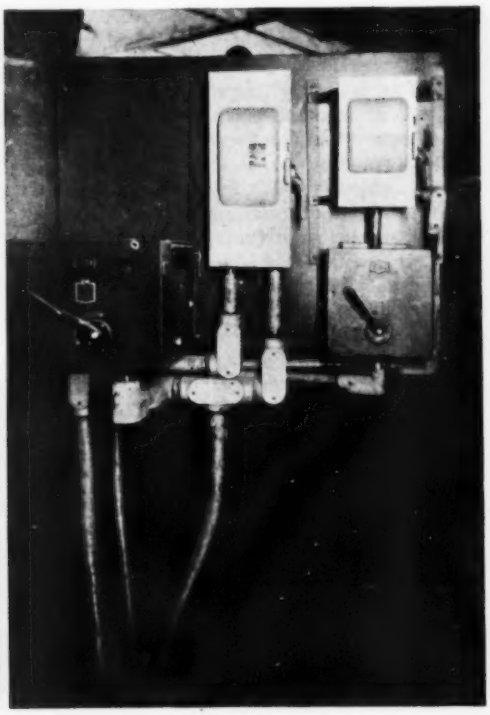

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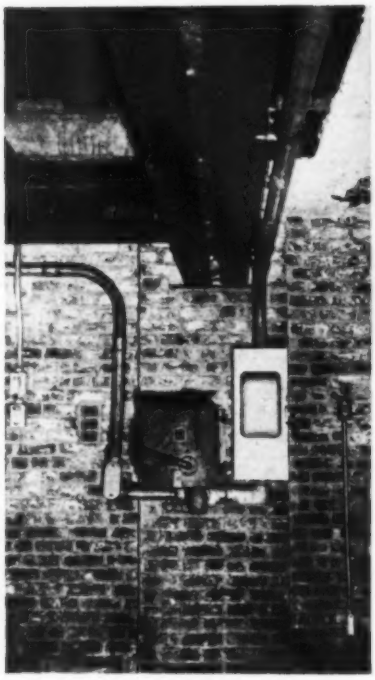

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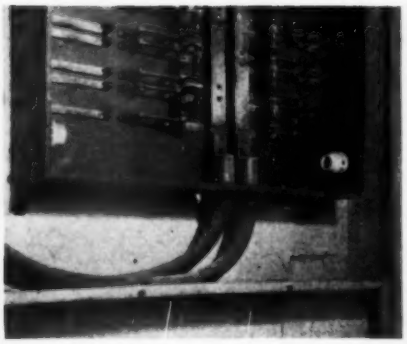

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10. Beam drilling was forbidden, therefore flange clamps were provided which held the conduits away from the steel far enough to make them entirely accessible for painting.

11. To eliminate moisture within the various power distribution panelboards, each unit was equipped with a pair of standard sockets mounted within the panel for burning two 50-watt, 110-volt, mill-type mazda lamps in series on the 220-volt power circuit. These lamps are controlled by a toggle switch in the gutter barrier, and are expected to also prove useful for lighting the panel during maintenance.

12. Although the conduit system was carefully butted to provide firm thread contact for ground current flow, all the receptacles were connected with separate copper ground conductors which terminated in centrally located ground conductor terminal buses. Each receptacle was of the polarized type with a grounding contact from which an insulated No. 8 grounding conductor was run to such terminals. A No. 2 ground wire was then run to the water system.

ture splices left sticking out of the fitting, so as to be accessible for future testing. After the compound had become "set" the splices were formed into the outlet fitting.

All cabinets and junction boxes were spaced ½ in. from the walls to provide for free air circulation behind them. Overhead drippage shields of solid sheet were placed on the top end of each cabinet, all conduits being taken from the sides or bottom. Each power and lighting panelboard was provided with one or more lamp receptacles, the radiated heat from the burning lamp being expected to prevent panel moisture. All cabinets and switch enclosures were hot-dipped galvanized steel.

Because new equipment was also provided in the engine room, a new wiring system and switchboard was installed in this area. The main switchboard was placed upon a gallery with a drip shield above it, and all feeders were run to the ceiling. No floor runs were permitted because of the moisture pocket or trap that inevitably results. The main generator leads were run around the side wall from the switchboard gallery and terminated with a downward slope in the cable pit. Although this overhead routing of feeders required longer runs than would have resulted from using lead-covered runs in the floor, the company preferred a wiring system which provided dry conditions within the raceways.

Because of the feeder routing methods employed, only one run of lead sheathed wire or cable was needed in the entire job. This lead covered run was necessary for a short underground feeder to a deep well pump that was located away from the building. All other wire in this system employed 30 p.c. grade rubber insulation.

Although extreme care was taken to make up all conduits to provide good electrical contact, an auxiliary network of insulated grounding conductors was run from the grounding contact of all polarized receptacles to a low resistance water main. A No. 8 conductor was pulled in with each pair of receptacle circuit conductors. Copper terminal blocks were provided in centrally located cabinets for connecting the various No. 8 grounding conductors. From these terminal blocks a No. 2 main grounding conductor was routed to the water main. With the foregoing grounding provisions, the use of portable power or heating equipment in damp locations is not expected to set up a shock hazard. A sufficiently low resistance ground current path has been provided to make sure that "live" frames of apparatus will quickly burn themselves clear or blow a fuse.

As put by M. T. Hochhausen, a pioneer electrical engineer who is an executive of the Trommer organization, and under whose supervision the work was installed, this new electrical system is expected to function under severe atmospheric conditions at minimum maintenance cost, and must withstand steady use without interrupting important brewing operations. Therefore the initial cost cannot be held down to arbitrary values lest important features be sacrificed that would involve much higher repair or outage losses later on.

Analysis of

PROPOSED NEW DRAFT

of the National Electrical Code

THIRTY-FIVE years ago it was evidently considered logical that the order of the National Electrical Code rules should follow the course of the current from the generating plant to the point where it was finally utilized. Thus, we find that the 1901 Code began with the rules applying to central stations, followed by requirements first for outside work and then for inside work, the latter being divided into three main parts: General, Constant Current Systems and Constant Potential Systems. Then came specifications for Wires and Fittings, Miscellaneous Requirements and rules for Marine Wiring. This plan served well enough for a Code of only ninety pages, but as more and more rules became necessary, it was found that making over a five-room cottage into a twenty-five room mansion by the process of adding two or three rooms at a time did not produce a structure that is satisfactory from any point of view. The original plan was therefore discarded entirely in 1923 and a much improved arrangement was adopted which is still in use.

Outgrown

As electrical applications increased in number and became more complex, leading to the development of new wiring materials and methods, the Code continued to increase in size and complexity and again outgrew its clothes. The arrangement adopted in 1923 and still in use is not entirely logical and was never sufficiently flexible to provide for natural growth and development. The wording of a good many paragraphs is too involved and in some cases is not definite and specific.

As a result the Electrical Committee of the N.F.P.A. at its last meeting, held in March, 1935, decided that in the interest of clarity and understandability, the Code was in need of a complete revamping as to form and this work was assigned to a special committee of nine members, with Dr. M. G. Lloyd of the United States Bureau of Standards as chairman. This committee has held numerous meetings during the past year and as a result of its labors, a complete new draft of the Code has been printed and will be submitted to the Electrical Committee for its consideration at a meeting to be held in Chicago on April 22.

Although no idea of arrangement can be secured at a quick glance because there are no chapter headings, it is apparent upon study of the contents that the committee has grouped together requirements of the same general nature in order to secure an arrangement that would be understandable and easily usable.

Chapter I, for instance, includes quite naturally definitions and also a few general rules. The general rules are included here because they are few in number and because this chapter apparently is a better place for them than any other.

Chapter II deals in general with the design of wiring installations and consists chiefly of the rules applying to branch circuits, feeders, services, overcurrent protection and grounding. Chapter III might well be headed "Wiring Methods and Materials." Chapter IV has to do chiefly with apparatus, though flexible cords, lamp-holders and receptacles seemed to have strayed over from Chapter III.

Chapters V, VI, VII and VIII cover the various special cases where the rules of the preceeding chapters must be supplemented by special requirements. The headings could be: Chapter V, Special Locations; Chapter VI, Special Apparatus; Chapter VII, Special Systems for Lighting and Power; Chapter VIII, Special Systems for Signaling and Communication.

All tables are placed in Chapter IX, the advantages of this plan being obvious. Those who use the Code continually become familiar with the rules, but cannot memorize all the data contained in the tables and it will be much easier to find the desired data if all this material is brought together at the end of the book.

Logical arrangement further involves the bringing together in one place of all rules applying to any particular subject. This has been accomplished in the new draft so far as is practicable. For example, rules applying to motors and their installation are found in the 1935 Code in Article 8 under the heading "Automatic Overcurrent Protection" and in Article 10, "Rotating Machinery." These rules include requirements relating to switches, controllers, overcurrent protective devices and conductor sizes, but all applying to the installation of motors, and so, in the new draft, they are all grouped together under the single heading of "Motors."

Repetition Eliminated

In the 1935 edition several pages of printed matter were saved by placing in Section 500 certain requirements that apply to all types of wiring of a given class, thus eliminating repetition of these rules. This idea is developed still further in the new draft by classifying such rules under the four headings of provisions applying to (1) all wiring installations, (2) all raceway systems, (3) all wiring in metal enclosures, (4) all cable assemblies. This arrangement may at first glance seem to require some extra mental effort on the part of the Code user, but on the other hand, there does not appear to be any good reason, for instance, for specifying in eight different places that metal enclosures shall provide effective electrical continuity.

Next in importance to the arrangement is the wording of the individual paragraphs. In the great majority of cases, paragraphs of the 1935 Code which are not clear have been reworded with considerable improvement. Clarity has also been pro-

moted by splitting up long paragraphs which include two or more requirements not closely related to one another. For example, the requirements of 506-f in the 1935 edition are in the new draft covered by Sections 3451, 3452, 2454 and 3053.

Contradictory statements have unfortunately been introduced in a few places, as, for example, in Section 2303 where paragraph "a" permits the use of an uninsulated neutral service conductor under certain conditions, while each of the following four paragraphs requires all service conductors to be insulated. Another such case is found in Section 4311, where the first paragraph definitely provides that all motors shall be provided with running overcurrent devices, while sub-paragraphs "b" and "d" permit the omission of these devices.

One of the most important rules in the 1935 Code is Section 205: "This Code shall be understood to treat only of approved materials, devices, fittings, appliances, machinery, apparatus and methods." This rather weak statement has been rewritten in Section 1101 of the new draft. This could be improved by adding the words "for the purpose for which they are to be used."

Fundamental Principles

At the Electrical Committee meeting a year ago the idea was advanced that the Code should contain statements of the "fundamental principles" upon which the rules are based. A few such statements are in the new draft. These experiments would seem to show that in order to avoid conflicts with the detailed requirements and undesirable restriction of future developments, these "fundamentals" must be so very general as to have little practical value.

One has only to glance over any page of the new draft to realize that the bold-face paragraph headings will be a very great help in finding the rules that apply to a given problem. A still further improvement could be made by using a slightly larger size of bold-face for the subject headings.

On the whole, a very decided improvement over the present form of the Code must be evident to any open-minded critic and the special committee is to be congratulated on the general excellence of its final product.

Inadequate Wiring Hazards

By W. A. Haig
Chief Electrical Inspector, Milwaukee, Wis.

THIS is the wording of Rule 613-a of the 1935 National Electrical Code and as can be seen, according to this rule, flexible cord is permitted in some places and cases, but the greatest problem that an inspector has to contend with is to try to explain to the public why cord is permitted in some places and not in others. They cannot understand, as a general rule, the difference in the hazard so far as location and specific uses are concerned. They of course know nothing about the different insulations upon the different types of wire and are at a loss to know why they should be restricted or reprimanded for doing something which, in their opinion, is no different than what someone else has done.

In the City of Milwaukee we receive thousands of reports from the fire department yearly indicating where there is cord wiring and these complaints are followed very promptly and closely, but it appears that with the condemnation and removal of the cord, the problem of adequate wiring is not solved because, in general, no wiring replaces the removed cord.

> *"Flexible cord shall be used only for pendants, wiring of fixtures, portable appliances and when a part of approved stationary devices where the transmission of noise or vibration make such construction desirable, or when it is necessary to use plug and receptacle connections to facilitate interchange of devices."*
>
> —NATIONAL ELECTRICAL CODE

It is quite generally known that cord wiring tends to overload circuits by making it possible for additional appliances to be added to and plugged in on regular wiring circuits. This overloading frequently results in the blowing of fuses and, as is the case many times where this bother continues, larger size fuses are installed, or the fuses are bridged with pennies or some other scheme or device known to the occupant of the building.

Cord Wiring Unprotected

Needles to say, this practice results in many electrical fires because of the fact that overloaded cords and cords which have been short-circuited are unprotected by the circuit fuses.

But fires are not the only hazard connected with cord wiring. We have had a number of deaths directly traceable to the use of cord. In one particular instance a small child, eighteen months old, while creeping across the floor came in contact with the base of a floor lamp and a heating furnace register at the same time. The insulation of the cord was frayed and made contact with the metal base of the lamp causing the current to go from the baby's hand through its body to the furnace register. The child was killed.

It is claimed and probably generally true that cord wiring is the direct result of inadequate wiring in the average home, and it is reasonable to believe that if the average home were adequately wired, there would be no need or necessity for cord wiring which, in turn, would have a tendency to reduce electrical fires and make wiring considerably safer than it is now and, in addition, would provide greater convenience for the user, as well as enlarge the market for electrical appliances and devices of the plug-in type.

What Does Adequate Wiring Mean to the Electrical Industry ?

by S. B. Williams
Editor, Electrical Contracting

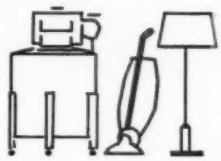
WHO besides the customer benefits from adequate wiring? The contractor, of course, and the wiring materials manufacturer as well; but what of the rest of the electrical industry?

Data on the benefits of adequate wiring are almost non-existent. Such material as has been collected, however, points to substantial benefits to the industry, in fact it would appear that the utility and the appliance manufacturers stand to profit much more from adequate wiring than do the contractor and the wiring supplies manufacturers.

In the data as shown on this page, no attempt has been made to go beyond the house itself although it is apparent that adequate wiring must mean larger transmission capacity, more distribution transformers, etc., back tc the generating station.

In other words, the data on this page is convincing evidence that the promotion of adequate wiring belongs to the entire electrical industry. So long as it is put off everyone suffers.

In 11 years, 20,585 Red Seal Homes in Toronto, Canada as follows:
Single Houses 10,685
Apartment Suites 7,233
Duplex Suites 2,667
In 1935 — 90% of all residential building was Red Seal.



Average appliance value:
Toronto Red Seal Home $825
Average non-Red Seal Home .. $400

Extra lamp bulb sales for Toronto Red Seal Homes run about 400,000 annually.

Energy revenue per additional outlet in Chicago, 20 cents per month.

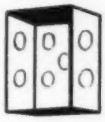
Outlets per 1935 Toronto Red Seal Home 62.87
Outlets per non-Red Seal Home in 1935—26.9

Kw. Hr. per Red Seal Home:
Denver average house of 7 rooms 1,776 kw.-hr. as contrasted with Denver average of 537 and national average of 676 kw.-hr.

Ranges installed in 91.7% of Toronto Red Seal Homes

EXTRA WIRING MATERIALS
required per 1,000 adequately wired homes:

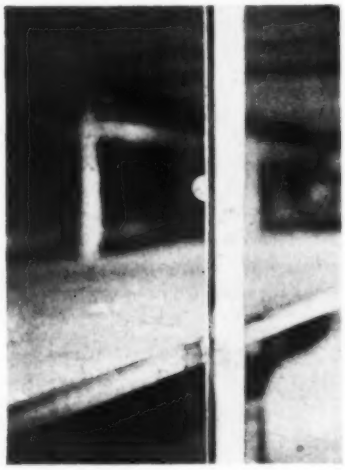
2,700,000 ft. of No. 12 wire
34,000 ft. of No. 6 range circuit wiring
20,000 ft. of No. 4 entrance material



88,000 outlet and switch boxes

65,000 wiring devices plus plates.

(Left) Racks were made in 3 ft. wide, 8 ft. high and 20-ft. long sections. These rested upon 2-in. by 6 in. by 38-in. wood floor sills at each pair of T-iron supports. These T-irons had 2-in. by 2½-in. by ¼-in. flat iron fastening feet welded on the bottom of them. Storage levels were varied as follows: Floor to top of first shelf, 30 in.; first to second shelf, 20 in.; second to third shelf, 18 in.; third to fourth shelf, 16 in.; fourth to fifth (top) shelf, 14 in.; top shelf to ceiling, about 5 ft. Thus a rack 3 ft. by 20 ft. occupied 60 sq.ft. of floor space, but provided six storage levels, or 360 sq.ft. of usable space. (Right) A variation from the standardized racks was made to fit an odd corner adjoining the elevators. Here the design employed a set-back frame work. A higher floor-to-first-shelf spacing clears small compensators.



Low-Cost Methods for Apparatus Storage

Lengths of structural iron were welded together in the shop to make non-sagging stock rack frames. Pairs of 8-ft. vertical supports occurring every 40 in. were of 1½-in. by 1½-in. T-iron, to which horizontal pieces of 1-in. by 1-in. L-iron were welded to form a frame or bed into which the tiers of shelf boards were laid without further fastenings. The use of ¾-in. tongue-and-groove flooring, cut 33 in. long, provided smooth shelves which were flush with the top of the L-iron shelf ledges.

THE need for inexpensive yet sturdy storage facilities for its diversified stock of new and used control apparatus, meters and other valuable items caused the Willey-Wray Electric Company, Cincinnati, Ohio, to build a series of five-deck stock racks which have increased by six-fold this company's apparatus storage space.

With its large motor service shop, construction tools and stock, and an average stock of 2,000 motors taking up considerable space, the problem of what to do for the many miscellaneous items was acute. If strong racks could be built at nominal cost, then many items could be carried that would otherwise become lost in the confusion, or that would of necessity for space be relegated to the junk heap. Adequate, easy-to-find storage racks meant that many items of considerable value could be retained for hurry-up replacements on important repair orders. If such items were junked for lack of storage, many rush orders would need to be held up for factory shipments—and in the case of some old types of controllers, the orders could not be filled because parts would no longer be obtainable.

Standard angle and T-iron shapes were welded together in the shop to form racks 20 ft. long, 8 ft. high and 3 ft. wide. The five decks or shelves were made of short pieces of ¾-in. by 3½-in. yellow pine flooring. These were cut in exact 33-in. lengths, and laid in place without any fastening nails or bolts being needed. At an average cost of $64 per 20-ft. section, this company secured a system of storage racks that provides 3,600 sq.ft. of shelf storage space for approximately 600 sq.ft. of actual floor space. Altogether about 200 lineal feet of such racks were built.

Latest Developments in

Surface Raceway Practice

A PRACTICAL means of demonstrating the latest developments in surface raceway wiring practice was provided in the construction of a new administration building and an addition to the Wiremold Company factory at Hartford, Conn.

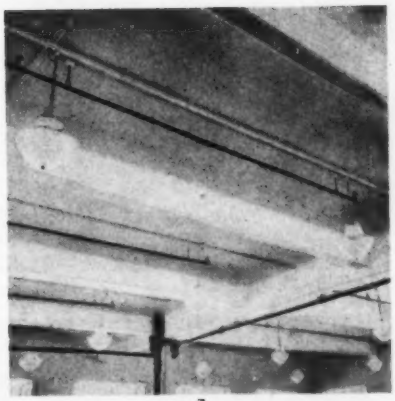
In the electrical work on these new structures, contracted by the Perry Electric Company of the same city, Wiremold raceway and fittings were specified with the proviso that the most practical ways and means of doing the work was to be utilized on all parts of the job, subject, of course, to N.E.C. rules. No makeshift or special methods were permitted, and the entire job was planned as a single unit system from panel box to outlet.

The result is a fine example of how by careful planning on the part of the contractor, runs may be routed and spaced to provide inconspicuous metal surface wiring without channelling walls or ceilings, and without notching or otherwise marring the plaster, woodwork or other finish.

Because many existing buildings need additional circuits, outlets and controls, the wiring in the new buildings was purposely left out during construction to be run exposed later on in Wiremold, in order that the complete system might be designed to meet conditions similar to those found in old buildings that are to be rewired. Moreover ample provision was made for additional circuits, outlets and controls, both in standard voltage and low voltage runs.

Panelled Ceilings

The office wiring layout was planned for high intensity general overhead lighting plus a system of office machine outlets that would allow each machine to be operated at its most efficient place, rather than to restrict the machine to the location of a certain outlet. The overhead raceways were laid out to create a paneled effect within the bays. To finish off runs in end



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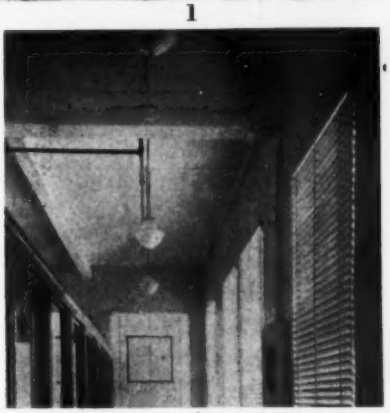

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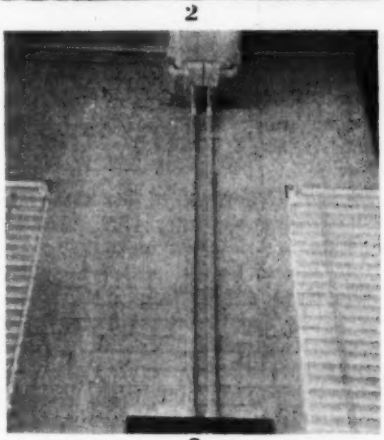

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1. The general office ceiling bays each have two 300-watt lighting units, fed from Wiremold run lengthwise of the bay center line. At each outside wall bay, empty runs were carried to the wall to finish off the panel effect. All ceiling units are plugged in and supported by fixture books.

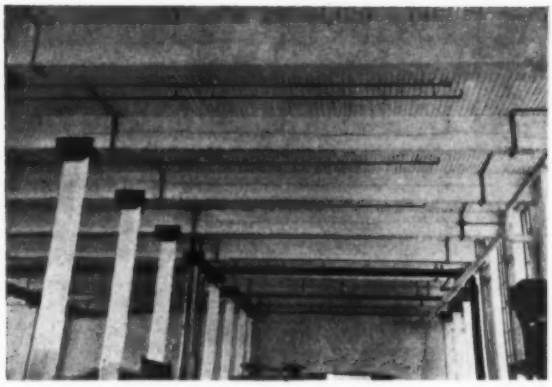
2. From the 20-circuit office panelboard two runs of Wire-mold were routed upward to the ceiling circuits and two runs each containing three circuits, were routed left and right along the outer wall baseboard for inserting receptacles.

3. Standard fittings permitted routing the two ceiling circuit risers along the opposite sides of a central beam, from which the taps were run out left and right to rows of ceiling outlets.

4. The main doorway casing is trimmed with an over-the-top loop baseboard raceway, to avoid cutting through the floor for a threshold jumper. Adjoining the door casing run is a neatly paralleled switch and clock receptacle run, also a fire alarm outlet circuit.

5. All desks which required office machine outlets were wired with beveled over-the-floor raceways from the nearest column or wall source of supply. "Pancake" fittings are used as junction or tap-off boxes and also for duplex receptacles.

6



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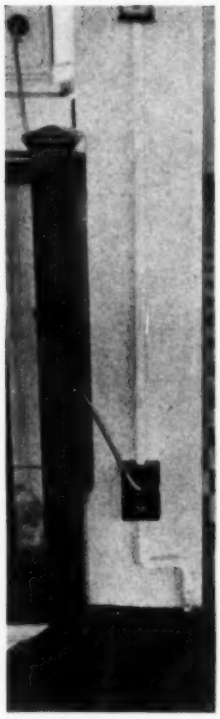

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9

bays, empty metal raceways were extended to the wall. The entire outer wall of the general office space was equipped with raceways run on the baseboard and painted black to match it.

Some Specialties

For the rows of desks located away from the outer walls, office machine and low-tension outlets were placed exactly as needed by means of a flat, beveled, floor-type two-piece raceway and "pancake" fittings. The floor runs crossed desk aisles where necessary, but because of their beveled design and their sloping edges, they set up no obstruction to office traffic. Also, because the raceway for desk outlets was laid on top of the inlaid linoleum, no cutting or patching of the floor covering was necessary.

In addition to the general wiring system, all telephone, telegraph, district alarm and code call wiring was enclosed in surface metal raceways. Even the lead-sheathed telephone cables serving the p.b.x. switchboard and the factory telephones were placed under a cover section of metal raceway. This was accomplished by straightening the cables in short spans until the full run had been worked under the raceway. The result was a uniform appearance of all exposed work without the sagging appearance of strapped cable. All splices were cabinet enclosed.

In the factory installation, a principal feature was the use of a large number of beam straps. These were used to route the home runs from each centrally located panelboard around each beam without the use of elbow fittings. This left no spans from girder to girder or from beam to beam to catch dirt or obstruct light. Instead, the ceiling of each factory bay is free of obstructions, allows full headroom and will thus allow easy painting of the ceilings from time to time.

The smaller motors were also wired with surface metal raceways, these runs being routed to offer the least possible projection on the ceilings or walls.

6. Low-tension outlets were also provided by means of beveled over-the-floor raceways and "pancake" nozzle fittings. These raceways were routed across the aisles.

7. Feeding downward from a column-mounted switch through a duplex receptacle outlet, this run to a basement light had to be off-set because of beams below. Standard elbow fittings permitted these outlets being centered on the column.

8. One of the problems in routing flat raceways has been to select 90 deg. elbows to make neat changes in the direction of runs. The development of twisted elbows as used for this stairwell switch leg limited changes of this sort to the use of two elbows, where formerly one internal and two 90 deg. flat elbows, or several other junction fittings would have been used. Furthermore, the raceway was kept tight in the corner of the ceiling and wall.

9. For the factory building the panelboards were located at various central points of distribution, with risers branched right and left to rows of ceiling outlets.

10. The first floor ceiling in the new factory. At the left near a row of columns is a line of tight-hugging beam straps which permitted the surface raceways to feed each line of plug-type ceiling outlets. At the right is a run of metal raceway for the heating and blower fan motors.

Behind the Symbol of Safety

By A. R. Small
President Underwriters' Laboratories, Chicago

LABELS have long been used to signify outstanding merit and to distinguish one product from another. However, the true value of any label is dependent first, upon the veracity of its author and the excellence of the standards of which it is emblematic; second, upon the intention behind its use; and third, upon the diligence with which its use is defended.

In the past four decades, a label familiar to all in the electrical industry (as well as to others) has come into prominence. It reads in part: "Underwriters' Laboratories Inspected."

The story behind this label, while known partially by many in the electrical industry—and by other industries as well, for its use is not wholly electrical—is interesting and unique. A fuller knowledge of the meaning of those three words may make for a better understanding among electrical contractors, architects, engineers, inspectors, and others, of the value of this label to the industry.

The place occupied in the electrical industry picture by Underwriters' Laboratories is outlined briefly in five paragraphs on the inside of the cover of the National Electrical Code, one paragraph of which reads in part: "All fittings and materials before being introduced for use should be submitted for examination and test to Underwriters' Laboratories."

Three Tools

Most of us are fairly cognizant of the purpose of this forty-year old organization and familiar with the engineering methods employed at its three testing stations in Chicago, New York, and San Francisco. Suffice it to say then that the preservation of life and property is the motivating factor; and the determination of the liability of failure of a product and whether or not this failure may result in a life, fire, or accident hazard, is the means.

The tools for accomplishing this end are: (1) standards of safe performance based on actual experience, engineering knowledge, and an appreciation of the problems of manufacturing and installation, which standards represent the consensus of the best minds in the industry, representatives of interested groups having a voice in their formulation; (2) an engineering manpower carefully selected and directed and specializing in particular fields; and (3) adequate physical equipment in the laboratories for the conduct of the investigations.

Symbols of safety. Labels for electrical devices and materials found by Underwriters' Laboratories' tests to be constructed in accordance with standard requirements.

This mechanism is set in motion by the voluntary submittal of a product by a manufacturer desiring an unbiased and authoritative opinion on its usefulness and merit in relation to the hazards mentioned above.

As Underwriters' Laboratories is a noncommercial organization operating for service, not profit, the charges for an investigation are controlled by the time spent by engineers in testing and examining a particular device. This expense, whether or not it leads to an approval, is borne by the submittor-manufacturer. An accurate record of this cost is kept by a modern cost accounting system.

Approximately 50 per cent of the original investigations undertaken by Underwriters' Laboratories reveal the necessity of changes in products to bring them into conformance with the requirements of the safety standards. This fact is convincing evidence of the need for such supervisory work and proof of the thoroughness with which the standards are applied. Out of those devices refused approval on the first submittal, approximately 50 per cent are subsequently resubmitted with the necessary corrections.

Approved List

Approved electrical devices are listed in the Underwriters' Laboratories' "List of Inspected Electrical Appliances," which is published annually and supplemented monthly. This List and the supplements may be had for the asking. Approved devices are also recorded in a card index file which is kept constantly up to date. The List and cards are circulated widely to electrical inspectors, rating bureaus, architects, engineers, buyers, and other interested parties.

It is therefore of primary importance that identification in the field of these products be easy and positive. Provision for this is made one of the requirements of listing (as approval is termed). Two methods have been devised; the one to be applied to a particular product being determined by the Laboratories at the time of listing.

One method with which we are all familiar is the use of the "Underwriters' Laboratories Inspected" label which is attached to the product, or the abbreviated form "Und. Lab. Insp." which is generally die-stamped into the product and is frequently used on such devices as snap switches. Products making use of such forms of identification are listed under what is known as Label Service. This is the class with

which we will be most concerned in this article. Classes of electrical products in this group are:

Armored cable and cord
Cabinets and cut-out boxes
Circuit breakers
Conduit and raceways
Enclosed branch circuit cut-outs
Fixtures—lighting
Fixtures—illuminated display
Fixtures—show-case and show window
Fuses
Heaters—car
Lightning-rod equipment
Nonmetallic sheathed cable
Nonmetallic surface extension
Panelboards
Switchboards—dead front
Motion picture machines
Receptacles for att. plug with switch
Service entrance cable
Service equipment
Service drop cable
Signs—electric
Switches—enclosed
Switches—snap
Transformers—gas tube sign
Cable—gas tube sign
Cable—oil burner ignition
RC wire
RC fixture wire
Flexible cord and fixture wire
RC flexible cord
Heater cord
Tinsel cord
Wireways and busways
Motors for hazardous locations
Panelboards for hazardous locations

Reexamination

In general, products in classifications other than the above are listed under what is known as Reexamination Service. To devices in this class it is not feasible to apply labels. Distinguishing catalog numbers, type letters, etc., as is the case also with devices listed under Label Service, are required to be assigned by the manufacturer to each listed device. For easy identification in the field, these catalog numbers, etc., are then recorded in the "List of Inspected Electrical Appliances" and on the index cards. This class of device may, however, at the option of the manufacturer and by agreement with the Laboratories, carry as evidence of approval, a reexamination symbol consisting of the letters UL in a circle.

A listing, however, is only the beginning of the Laboratories' work; for any organization presuming to publish outstanding advices concerning the products of another must know at all times that the current output of these products remains such as to warrant the published endoresement. Therefore, Underwriters' Laboratories operates a factory inspection service on all approved products, making approval and listing contingent upon the manufacturer's agreement to the terms of inspection. Between 50,000 and 60,000 inspections annually are made — manufacturers' plants — to verify the fact that approved products are being made in accordance with the listing description.

Underwriters' Laboratories' inspectors in 186 major cities throughout the United States and Canada, and representatives also in London, England, and Honolulu carry on this work. Technical experience is requisite, and for the most part these men are technical graduates. Each has been trained in the work of the Laboratories and, with the aid of the necessary Standard and a "Procedure" (as the detailed description of a listed product is called), is capable of conducting an inspection and testing any of the approved products manufactured in his territory. The variety of this work, and the fact that the same man often works in the plants of competing manufacturers, requires that inspectors be selected with extreme care. Changes

Card index classification of listed electrical devices

in the inspection force are infrequent, some men having served for thirty years and more.

Inspectors are responsible directly to the superintendent of Label Service at the main offices and principal testing station in Chicago. From him they receive their inspection orders, and to him they report the results of their findings on forms provided for the purpose.

Inspections on products listed under Reexamination Service are conducted quarterly, semi-annually, or annually, according to the classification of the devices and the necessity of supervision.

In the case of products bearing the "Underwriters' Laboratories Inspected" label, the frequency of inspection is determined by the character of the product, the possibility of variations in its manufacture, the proficiency of the manufacturer's employes and the efficiency of his own inspection, the co-operation extended to Underwriters' Laboratories' inspectors, and the quantity of labels employed. This latter is a gauge of the manufacturer's activity and as orders for labels are usually filled from stock at the inspector's office, he can schedule inspections accordingly. The reputation of the manufacturer for complying with the requirements of Underwriters' Laboratories is soon established and inspectors quickly become familiar with what to expect at each of the factories in their territories.

Underwriters' Laboratories' inspection is primarily intended to be a check on the manufacturer's own inspection. When products are of the type which Underwriters' Laboratories' inspectors must test, as well as examine, manufacturers are required to provide the necessary test equipment and are expected to use it also in their inspection. Co-operation on the part of the manufacturer in this, and his good intention in applying labels only to those products which are eligible for labeling and, as shown by his own inspection, correctly constructed, is assumed until evidence to the contrary is received.

Factory Check

Familiarity with the methods of a particular factory, a constant knowledge of what is in production, and a comparison of the number and serial numbers of the labels on hand there, with the number issued, will usually enable an inspector to determine whether or not the labels are being used correctly.

But this is not the only check relied upon.

Service engineers in the New York and Chicago offices supervice the work of the factory inspectors, review their reports, direct their activities, and regularly check the relation between the number of their inspections and the number of labels used at a particular plant. Specializing in certain industries, they act as liaison men between factory inspectors, clients, and the engineers in the Laboratories who originally tested the products. They are also in contact with municipal inspectors and authorities, receiving from them reports of the condition of labeled and listed products.

In addition to these checks, samples of the materials which the inspectors test at the factories are

regularly sent to one of the three laboratories for check test under standard laboratory conditions.

And finally, a market sample test program is maintained, whereby samples of many classes of approved products are purchased at regular intervals from wholesalers, retailers, contractors, and dealers and sent to the Laboratories for test. Field engineers in trucks outfitted as portable laboratories for testing certain classes of materials tour the country, purchasing in the open market samples of listed materials. These samples are tested "on the spot," and in the case of failures, identical samples are sent to Chicago for check tests. These trucks also aid in procuring market samples of devices which they are not equipped to test.

Demerits

As a result of the findings of a Laboratories' inspector, 100 per cent inspection may be instituted on any particular catalog number or all of the labeled product output of a factory if an excessive number of failures are recorded in a given period. Demerit schedules for many classes of products in various industries determine when the deadline has been reached. These demerits are intended to be a forewarning of impending trouble and to allow an increased inspection to be instituted in time to prevent failures from becoming rampant. Under this system, the inspector may, if he considers it advisable, take possession of the labels at a factory and, until the trouble is entirely eliminated, issue labels only for those devices which he finds acceptable.

From this and the foregoing, it may be seen that the Laboratories' inspection program is extremely flexible. Because it is so personalized and can be adapted to meet whatever conditions exist, very few instances of fraud or intentional misuse of the label and approval have been recorded. Chronic misuse of the label is not tolerated. The following typical method of dealing with such cases is taken from the records.

In several instances over a period of years, labels issued for the listed products of a certain manufacturer were found in the field attached to unlisted products of the same manufacturer. Upon request, they were removed and sent to the Laboratories for cancellation. Apologies from the manufacturer explained that the occurrence was an error and not at all intentional. Nearly a year later a fire revealed another identical misuse of the label by the same manufacturer. Accordingly, the following program was immediately instituted:

The factory was placed on 100 per cent inspection, the inspector taking possession of all unused labels at the plant and thereafter making inspections only on certain days and when notified in advance. Labels were issued for each device found acceptable, and the attaching of the labels was witnessed by the inspector. The manufacturer was required to furnish a list showing, under the serial number of each label, the following:

(a) Catalog number and serial number of the device, (b) Make, electrical rating, and serial number of an accessory part of the device, (c) Shipping destination of the device.

By means of these lists, inspections were made of a goodly proportion of these devices when installed in the field to be sure that the labels had not been removed.

The expense of this extra inspection was billed monthly to the manufacturer who, in addition, was required to maintain at the Laboratories a substantial balance in evidence of good-will.

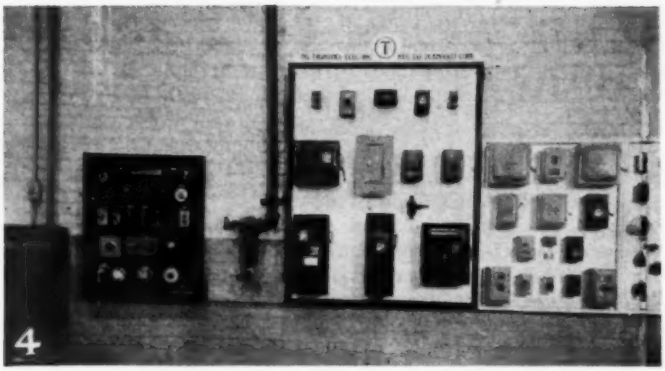
Other instances could, of course, be cited but they would be more or less similar to the above. Counterfeiting has been attempted but without success. Unintentional misuse of the label occurs occasionally but is soon corrected, and education and co-operation keep it at a minimum. Withdrawal of the listing as a final resort is rarely necessary.

In rigidly controlling the use of the label and approval, Underwriters' Laboratories is not only defending the integrity of an accepted symbol of safety but at the same time is fulfilling its obligation to all manufacturers of listed products by seeing that their competitors live strictly up to the same requirements by which they operate. That is why no effort in defense of the label is too great.

How Hartford Conducts License Examinations

THE city of Hartford, Conn., where electrical contractors, journeymen electricians, and maintenance or limited-scope electricians are all required to be licensed, maintains a special room where examinations are conducted in a manner as nearly like actual working conditions as is practicable. Since this city has such an all-inclusive ordinance requiring all workers to be qualified, an examining procedure was developed that would provide fair tests of three prerequisites, namely: (1) Experience, (2) practical ability, and (3) theoretical knowledge. Likewise, it was necessary to arrange the examinations to conform with the graded responsibilities of the master electrician, the journeyman, and the maintenance man.

As conducted, the examinations give full credit to the applicant who has a worthy experience record, who demonstrates good practical ability as a workman, but who is perhaps weak on theory or written tests. On the other hand, an applicant who has "crammed" with Code and theory, but who lacks experience or practical mechanical ability is not so likely to be turned loose on the public as an accredited and licensed worker. The master electrician applicant, for instance, is subjected to a practical test in keeping with the wider scope of his occupation. This includes a written set of more difficult questions on the Code, and on electrical



1. An applicant who lacks practical experience cannot escape the simple connecting or "hook-up" tests that are assigned to him at this bench. In the left foreground is a 2-phase squirrel cage motor and complete automatic control equipment, with diagrams for making connections. At the bench are twelve device fittings with empty connecting conduits. These must be fitted with various outlets and switch controls, and hooked up while examiners oversee the job. In the background are several meter services for connection.

2. Another bench is provided with a bank of lamps and indicating instruments. Here practical maintenance problems, testing procedure, making of simple splices and joints, and other everyday work of the trade are assigned to the applicant. The young man at the left has just made a small splice, while Arthur Gaskell, a local electrical contractor who is chairman of the Hartford examining board, looks on.

3. Joseph P. Rohan, chief electrical inspector of Hartford, Conn., is a member of the examining board. At his left is a display panel upon which are drawn the connection details for larger jobs as are provided under the power company service requirements. This display is an important part of the examination for master electricians' licenses.

4. Examinations are conducted in a portion of the city testing laboratory, where the walls of one side of the room have been reserved for use as educational displays of modern electrical materials and devices. About twelve display panels, such as those shown, have been placed along the wall. Heavier devices are placed on the floor and on benches. Because all these items are available, the examiners can readily refer to any phase of the art of electrical construction, using the actual materials for the purpose of discussion or demonstration.

problems that occur in everyday work.

Applicants for limited licenses, on the other hand, who are usually maintenance men or service men for oil burner, sign or refrigerator companies, are given a test which differs somewhat from that given the all-around journeyman applicant. Maintenance problems, an understanding of the fundamentals of electricity, and a particular knowledge of specific types of equipment are the principal practical tests given. These are weighed against the credits given for experience and for the correctness of written answers to selected questions.

The examining board has at its disposal part of a room used by the city for testing building materials. A portion of this room is also used by the plumber and steam fitter examining boards. Equipment has been provided that permits the examiners to observe the applicant's ability to actually test, assemble, install and connect electrical devices, fittings and conductors; make splices, and look for trouble in equipment. With a wide variety of electrical products mounted on display boards within the examination room, the discussion of materials and their application is also made practical.

Written questions that comprise a part of the examination are selected from a set of more than 200 questions that were prepared by the examining board. A permanent record is made, indicating which of these questions were used for each applicant's test.

The methods of examining applicants as followed at Hartford, offer an example to other examining boards that are looking for ways of conducting tests impartially.

MOTOR DRIVES Build Industrial Volume

SPECIALIZATION in power transmission sales work has kept a ten-man crew busy with industrial work throughout the depression years for the Furst Electric Company, Inc., Long Island City, N. Y. The sale of fifty or more 5 to 50-hp. short-center drives per year, and many more for smaller motors, has been instrumental in maintaining a balanced flow of industrial business. From this sales effort has come closer contact with plant operations, resulting in large wiring jobs, apparatus sales and repairs, and periodic maintenance contracts.

According to N. E. Furst, the industrial electrical contractor is best able to specialize in such work. Because of already having complete installion facilities, he needs only to train his men for doing such mechanical jobs as are involved in transmission modernization. The principal phases, namely, motor selection, control modernization and wiring design are taken for granted as being already well in hand. Being thus qualified, the modernization of motor drives requires a sound and practical liking for millwright jobs, bearing care and selection, remodeling safety guards, and an acquaintance with various types of industrial machinery.

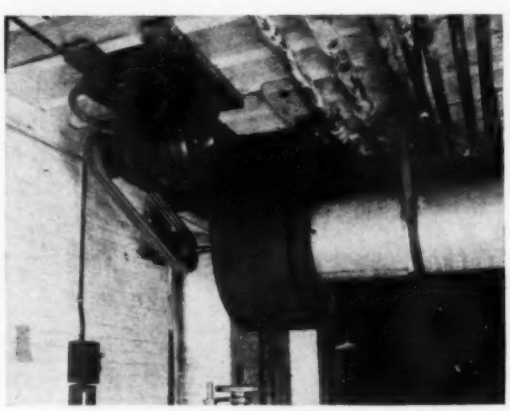
Sales Points

The advantages derived from modern motor drives are centered chiefly on conserved work space, the elimination of belt slippage, lessened belting investment and maintenance, and ease of adapting individual motor drives to eliminate extra pulleys, belts and friction loads. Another important advantage is the reduction of accidents and delays that occur in replacing unruly belts. One 50-hp. drive that was sold by Mr. Furst five years ago has operated eighteen hours per day without change of belt or pulleys.

With short-center drives is always combined a job to rewire part of the motor circuit. Once the ice is broken, there is a further opportunity to sell modern motor starters, and in some cases, motors of the correct size, speed or type that will operate the machine more efficiently. Mr. Furst has workmen who can do a good millwright job as well, which results in erecting special bases, platforms or brackets in conjunction with modernization work. Often a set of old sleeve bearings on the machine may be replaced with roller bearings, while some of the machine's shafting is re-arranged to suit the more compact pulley positions. These complete service facilities have caused this company to become known in this industrial community as motor drive experts, and Mr. Furst has used promotional mailing stuffers steadily to keep this company's name before his prospects.

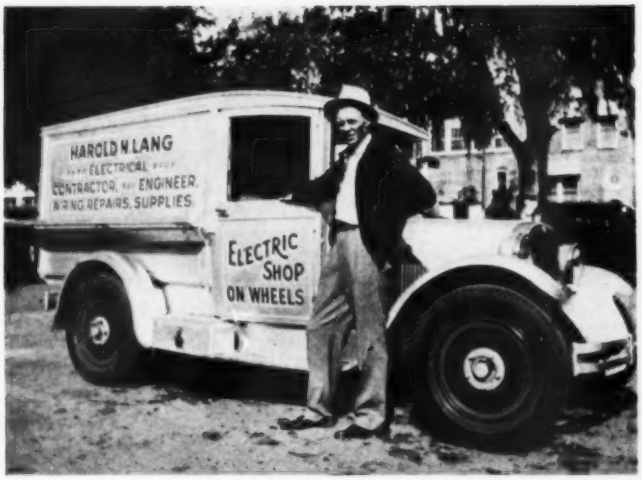
Builds Maintenance

Where this company got a new industrial customer through transmission sales it was frequently possible to secure maintenance service contracts for the entire plant. Because of this intimate monthly contact, the knowledge of all operating difficulties enables this company to concentrate on every chance to improve transmission conditions. With a complete service to offer, whether it be motor repairs, apparatus sales, general supplies, or installation work, there is a steady run of good business which is far removed from the open field of competitive contracting.



Blowers offer good opportunities for modernization especially when ceiling drives are involved. A long 8-in. belt came out when this 15 hp. motor was moved up close. New ball bearings were also sold for the blower.

This cross-cut and ripping saw formerly had one motor, a double shaft and two 10-ft. belts, requiring a large box guard on the floor. Two 3 hp. motors and short center drives were mounted on special swinging brackets. These brackets connect with the saw arms to rise on the same radius without changing the belt tension. All work by the Furst Electric Company.



Harold N. Lang and one of his "Electric Shop on Wheels" units.

The Better Housing Show Booth where 2906 persons registered.

The miniature model and its proud caretakers.

Selling a "Shop on Wheels" to the Community

HAROLD N. LANG of Orlando, Fla., not only takes his shop to the customer by operating an "Electric Shop on Wheels" from his downtown place of business, but has carried out a novel campaign to capitalize this community service.

During the Junior Chamber of Commerce "miniature model" parade recently held in Orlando in conjunction with a Better Housing Show, the Lang entry was a miniature "Shop on Wheels." Two young huskies towed it through the streets. After the parade, this model was displayed at the Lang Electric Shop.

Mr. Lang had a booth at the Central Florida Exposition housing show, in which his "Electric Shop on Wheels" service was a prominent part of his booth signs. Special inducements resulted in 2906 registrations at the Lang booth during the week. From the information that a young lady attendant obtained of those who registered, Mr. Lang was able to classify local and rural prospects for electric ranges, water heaters, water systems, prospective builders of new homes, and prospects for additional wiring or refixturing.

Photographs of the Lang "Shop on Wheels" are sent out as mailing stuffers to prospects and to other selected names from time to time.

Claiming to have installed the largest number of electric ranges in Orange County of all local contractors, 124 of them in 1935, also 41 water heaters, Mr. Lang considers his publicity methods worthwhile.

Quick and Easy

Coil Removal

AN ELECTRIC hoist for pulling out old stator coils, an air gun tool for cutting the ends of coils, and a motor clamping stand outfit was installed by the Eifler Electric Company, Inc., Union City, N. J., for quick and easy stripping of stators. This provides a completely mechanized method for performing the first important operation in rewinding a.c. motors. Because of having applied a hoist for coil pulling power, this work is done without resorting to the customary insulation burning procedure. Instead, the insulated coils are removed "as is" from stator cores, whatever may be the condition of the motor that is to be rewound.

This company is reluctant to risk the uncertain burn-off temperatures that are introduced within stators, for the sake of easy coil stripping, although conceding that totally burnt-out windings may themselves have generated high temperatures in the motor. This power stripping method, however, eliminates the need for risking a cracked motor frame, or possible lamination damages in burning out the windings of motors which have never before been excessively overheated.

No Smells

With insulation burning thus eliminated, the shop is freed from one of its very annoying jobs, and the neighborhood is also saved some obnoxious smells, not to mention saving the cost of maintaining a hazardous "Devil's hole" indoors, or an outdoor burning oven.

The equipment was arranged to provide a rugged clamping stand for stators ranging from 1 h.p. to 40 h.p., to permit the free use of an air gun coil-cutting tool. After the coils have been cut at one end, the stator is up-ended and again clamped down for the coil pulling operation.

The operator has two floor treadle switches to operate a reversing contactor which controls the electric hoist in "up" or "down" travel. Two sizes of coil-grippers are used, one for small motors, the other for larger sizes. These have rings at the end to hook on the hoist cable hook. As the gripping device is set upon a coil-end, its jaw tension is increased in proportion to the hoist cable tension. The operator's hands are free to guide the gripper, as all hoist travel and jogging or "inching" is done with the foot. A bracket type cable limit switch near the hoist drum provides a safety stop, should the operator forget, or be unable for some reason to stop the hoist.

In building this outfit, two 12-in. by 12-in. horizontal timbers were bolted to heavy posts that support the hoist. These timbers provide a platform for the stators. Two channel iron cross-pieces that slide along the under side of this platform provide a stop and guide for two ¾-in. threaded steel clamp rods. The ends of these channels lie upon the flanges of two heavy angle iron corner beads which are bolted to the lower outside corners of the timbers.

Simple Clamping

When a stator is laid flat upon the timber platform the two clamp rods are hooked over the rim of the motor frame. Heavy turn wheels that are threaded upon the lower ends of these rods are quickly spun tight against the under side of the channel iron cross-pieces until the rods have pulled the stator tight against the platform.

Here then is an outfit that involves no complicated equipment, which provides rigid fastening for cutting away windings mechanically, and finally lends itself to the application of hoist power for coil removal.

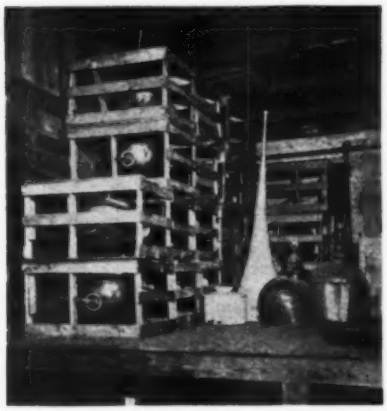
(Left). Rigid and readily adjustable motor clamping devices make possible the application of hoist power to coil stripping. Operator controls the hoist with floor treadle switches, with both hands free to adjust and set the coil gripper for each "bite."

(Right). Before coil removal work is commenced, this clamping stand is used as a rigid support while cutting away the coils with an air gun tool.

Construction . . Methods . . . .

Damage-Proof Floodlight Crates

Because of specializing in large temporary decorative lighting installations in greater Miami, Fla., the Geo. LaVigne Co. carries a large stock of flood-lighting equipment. To



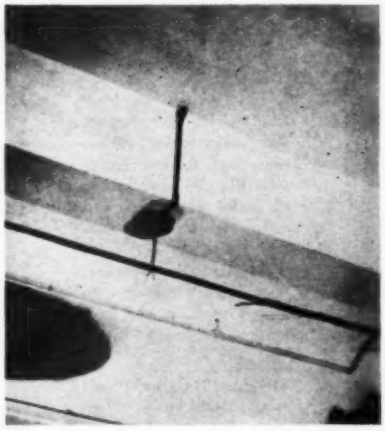
prolong its usefulness and to guard against lens and reflector breakages, housing scratches and dents, and general transportation damages, each large floodlight is provided with its individual crate. Each unit is crated with its own heavy timber base left attached to the mounting crawfoot. Generally they are placed on the ground upon these bases for large outdoor effects, for theatre "premier" showings, etc. About one hundred, 1,000-watt units are kept on hand for this type of work, as well as sound equipment, special ornamental lighting standards, and other similar equipment.

Self-Indexing Job Numbering System

Each job number tells its own history in the files or on the plans or specifications that go out of the offices of Ray W. Chanaberry, Inc., Louisville, Ky., electrical engineering and estimating bureau. The first entered in 1935 was number 351, while the 32nd job, for instance, was numbered 3532. The 12th job entered in 1936 bears a job number 3612. If a company has engineering work done during the year in sections, or where the project comprises several buildings that are to be handled under separate billings, they are all given the same master job number, but have an alphabetical designation added on in consecutive o der. Thus a local four and a half m..l'on dollar distillery project that is now under construction is numbered similar to: 3612-a, 3612-b, 3612-c, etc. While one master job number covers this particular project, the sub-letters a, b, c, etc., identify all subsequent work orders for this project.

Out-of-Sight Extensions to Beam Outlets

A remodel job in a Jacksonville, Fla. shoe store required several additional lights under furred and plastered steel beams. A minimum



amount of wiring was run exposed by fishing armored cable above the hung ceiling from the nearest ceiling outlets. These cables were brought through the plaster next to the side of the beams, from which point short pieces of surface metal raceway and fittings were provided to the beam outlet box. Each vertical stub of raceway was made on the rear-of-store side of the beam, thus shielding these small runs from the customer entering the store. This work was installed by Henderson's Electric Shop of Jacksonville.

Sealed Wall Sleeves for Busbars

Oval-shaped transite ducts were installed in a 10-in. wall between the transformer room and the main switchboard room to accommodate four ¼-in. by 4-in. main feeder busbars. These ducts were 7½ in. high, 3 in. wide, and 12 in. long. After

the buses were installed, the ducts were sealed with melted "ozite" compound, thus protecting against gases or fumes which might circulate into the switchboard room if a transformer oil explosion should occur. This installation method was chosen by Joseph Newman, Inc., of Jersey City, N. J., for wiring a local armory in preference to slotted pieces of switchboard insulation, and the supporting framework which the latter materials would have required.

Enclosed Bus Ducts for Low-Ceiling Vaults

Because of limited ceiling height, the 2300-volt primary feeder and the lighting and power secondaries were installed in metal enclosures above the transformers which serve a new Jamestown, N. Y., high school. The Linquest Electric Company local contractors, installed three 75 kva. lighting transformers and one 100 kva.

A SALESMAN TALKS FROM THE HEART

"I'M ON THE FIRING LINE IN THIS ELECTRICAL BUSINESS. I HEAR IT WHEN THE JOB GOES GOOD. I HEAR IT WHEN THE JOB GOES SOUR! THEY RUB MY NOSE IN IT WHEN IT'S ESPECIALLY BAD. AND ALWAYS IT'S A TRIFLE. THE TROUBLE ALWAYS STARTS WITH AN 'UNIMPORTANT' DETAIL, SOMETHING SOMEBODY FORGOT, SLIGHTED, OR HOPED WOULD BE OVERLOOKED. AND THAT'S TRUE...FOR NO ONE WOULD PUSH A SWITCH THAT OBVIOUSLY IS DEFECTIVE. IT'S THE OVERLOOKED DETAIL THAT TRIPS YOU UP. WHEN YOU KNOW SAFETY SWITCHES LIKE I DO, YOU'LL ALSO SAY NO DETAIL IS TOO SMALL TO BE OVERLOOKED, NO DETAIL TOO UNIMPORTANT TO BE PERFECTED."

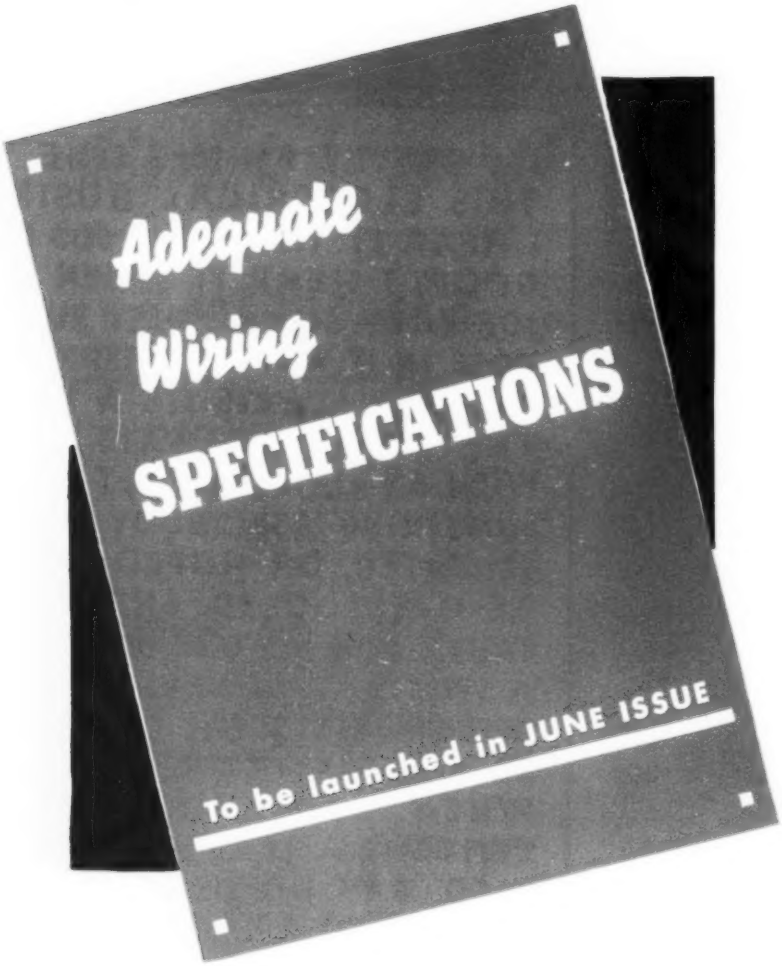
Not Fussy About the Finish?

PROBABLY the semi-dull finish used on C-H Safety Switches doesn't seem very important. Possibly you're not fussy about appearance—not greatly impressed by the fact that wiping *this* surface with an oily cloth removes the scuffing marks safety switches often get in handling. Finish is just a *detail*—but you should consider that this non-flaking C-H finish does give added years of protection against rust—that it can be applied *only* to an A-1 steel.

This is what C-H is driving at. In a safety switch, as in anything else, success or failure hinges on one detail. Which, no one can tell, but the maker of a good switch can take no chances; must make *all* details perfect. Does it pay? Well, ask the contractors and wholesalers who feature the C-H line of Safety Switches. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1306 St. Paul Avenue, Milwaukee, Wis.

● *The C-H line includes all types and sizes of Standard, Weatherproof and Explosion-Proof Safety Switches, and Range Switches and Service Equipment for every locality—all built to the famous C-H Control Leadership Standards.*

CUTLER-HAMMER C-H SAFETY SWITCHES



For all types of occupancy

WHAT does an architect do when he has to get out a set of specifications for electric wiring? Judging from a great many specifications that come out of architects' offices where no electrical engineering talent has been available, it was less fun for the one preparing it than it was for the one trying to estimate from it.

Contractors know that when specifications are poorly drawn, no two bidders will figure on the same job and, consequently, some fancy price-cutting, based upon a hoped-for large bill of extras, will result. Poor specifications, in other words, have been one of the most demoralizing influences the electrical contracting industry has had to face. If specifications could be properly drawn and be properly inclusive, then the chances for extras would be smaller and contractors would have less incentive to gamble in their bidding.

Also, poor specifications leave all the room in the world for minimum wiring jobs. In fact, it would be useless for anyone to figure better than minimum with loose specifications, because the chance of getting the job would be nil. It must be apparent then that poorly drawn specifications give rise to inadequate wiring jobs.

For years, ELECTRICAL CONTRACTING has promoted better and more adequate wiring. It has made investigations of its own to bring to light existing conditons and now, as a sort of climax, it is planning in its June issue to make its greatest contribution to the advancement of adequate wiring — specifications for the adequate wiring of dif-

ferent types of buildings in accordance with accepted standards.

This is a job which the industry has long wanted done but which has been delayed because of differences of opinion, necessity for compromise and the natural slow progress of committee work because of the necessity for giving full consideration to the different interests of the several groups.

Eventually, standard specifications which have the approval of the entire electrical industry will be written, but in the meantime the construction of new buildings is again under way. Therefore, as a stop gap against the time when the industry's own mutually agreed upon specifications are ready, ELECTRICAL CONTRACTING will offer in its June issue, a means of improving electrical specifications and adequate wiring.

Arrangements are being made to place this issue in the hands of every important architect in the country, and in order to make sure that every architect for whom our readers are figuring work gets a copy, we ask that contractor readers send us the names of all architects to whom they would like to have us send the June issue. Issues will be sent to all such names without any obligation on the part of the contractors sending us the names.

Because the publication of separate specifications for a large number of occupancies would involve too much duplication, it was felt that a simpler system could be found that would permit almost every occupancy to be covered. Accordingly, residential specifications will be treated separately and will include specifications for electric kitchens.

Accompanying the specifications for other types of buildings will be standards for adequate wiring to provide for lighting, building power and the several types of signalling, speaker and alarm systems. These standards will follow industry standards so far as they are available.

Finally a list of the several types of occupancy will be developed and under each occupancy will be listed the specification points to be covered.

Because specifications are based upon layouts, a simple yet comprehensive method for making schematic layouts will be included. While schematic diagrams have been used by contractors for years, this will be the first time that a plan for bringing them into general use in an architect's office has ever been worked out.

Since these specifications are to be non-competitive, particular care will be taken not to permit any individual preferences to enter in. No choice of method or material will be made for the architect, engineer or contractor using these specifications, but instead there will be given the proper information covering any method he might select.

Again, when it comes to such specialties as signal systems, no attempt will be made to influence an architect's choice of a particular system, but he will be provided with standards and specification paragraphs that will enable him to write an intelligent and complete specification.

In other words, this issue will include specifications for adequate wiring for any regularly used service in a building.

EDITOR

3-ph. power transformer. The secondary leads were extended into an overhead busway which continued through the wall to the main switchboard in an adjoining room. The

primary feeder cables were enclosed in a wireway which was installed on the back wall above the fused disconnecting switches for each primary transformer lead. In case of trouble occurring in this transformer station, there is a minimum of exposed live contact to interfere with emergency repairs.

Supporting Roof-Type Service Conduits

A 2-in. service conduit which projected upward through the roof for 6 ft. was supported in a rigid and inexpensive manner by two diagonal

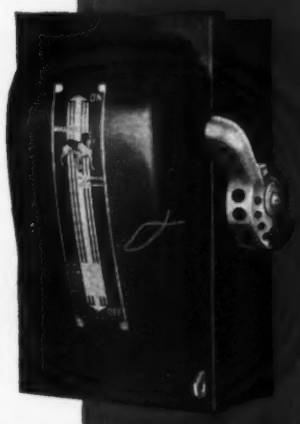
braces made from ¾-in. rigid iron conduit. The ends of these braces were flattened and drilled for bolts.

MODERN Contractors SELL and INSTALL the *Stylined* BULL DOG

Vacu-Break

SAFETY SWITCH

The VACU-BREAK Principle of Circuit Rupturing establishes a New Standard of Safety Switch Quality which will repay investigation. A few of the Notable Features are illustrated here . . . Ask your Electrical Supplier to Show You or write for Illustrated Bulletin.



BETTER PERFORMANCE

•

BETTER APPEARANCE

•

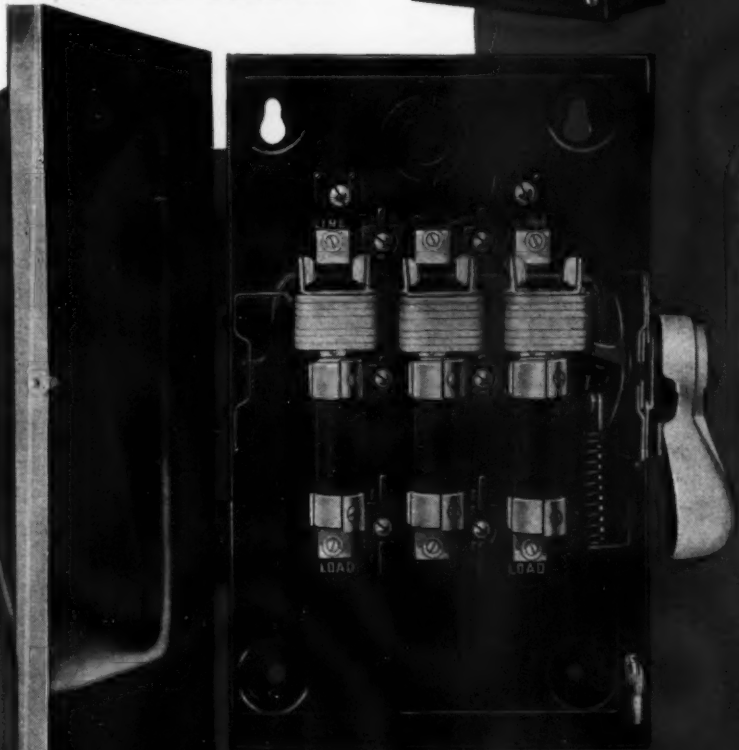
COMPACTNESS with a higher SAFETY FACTOR against flash-over, ADEQUATE WIRING SPACE where necessary and Modern STYLINED CABINETS with Handles to match are features of all 3 VACU-BREAK Lines:

MASTER (Type A) STANDARD (Type C)

JUNIOR (Type D)

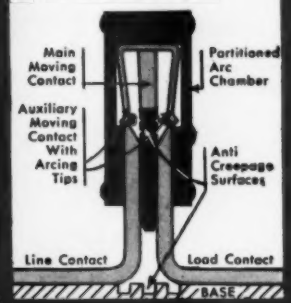
FUSE GRIPS (non-holders) secure, by clamping screws or steel springs, a full area-pressure contact which improves conductivity and reduces fuse-heating.

WIRE GRIPS (solderless lugs) are used for "line" and "load" wiring terminals. They not only save solder and wiring time but make a cleaner and more workmanlike job and ensure better contact.



Master Type—60 Ampere—230 Volt—3 Pole—Fusible
Catalog No. 14222

MASTER TYPE
Arc-Rupturing Chamber and Contacts
(Rupturing Position)



The ARC is DOUBLE-GUARDED first by the Arc Chamber and then by the Cabinet.

The MASTER TYPE has, in addition to the main moving contact an auxiliary dual-break contact with arcing tips that absorbs what little arcing does occur in the VACU-BREAK chamber.

Write For 16 Page Bulletin

BULL DOG ELECTRIC PRODUCTS CO.

DETROIT, MICHIGAN, U.S.A.

Bull Dog Electric Products of Canada, Ltd.
Toronto, Ontario

A NEW LINE OF MOTOR *and* EXCLUSIVE

NOW

STARTERS *with a famous* FEATURE...

THE "DE-ION" ARC QUENCHER

Fresh from years of highly successful service on Westinghouse safety switches, the revolutionary "De-ion" Arc-Quencher which makes possible the Nofuze circuit breaker, now adds amazing advantages to the complete new line of Westinghouse Linestarters. A line completely re-styled . . . incorporating every worth-while feature in every type and every combination . . . and designed with all parts easily accessible . . . PLUS the *exclusive* "De-ion" feature that brings you:

SUPER-SAFETY—No flash or flame—the arc is snuffed out instantly by the "De-ion" Arc-Quencher. This means elimination of flashover, assuring safety for operators.

LONG LIFE—*Instantaneous "De-ion" arc quenching means no pitted contacts*—practically unlimited contact life. Simple mechanism with fewer parts.

COMPACT DESIGN—*Banishing of arc hazard by the "De-ion" quencher permits a snugly-built, compact mechanism* retaining ample wiring space and complete accessibility of all parts for quick installation or inspection.

RELIABILITY—The "De-ion" arc quencher confines, divides, and extinguishes the arc without the usual flash and flame—insuring freedom from flash-overs, high overload capacity and dependable, trouble-free operation.

For complete details on New Westinghouse Linestarters, write to Westinghouse Electric & Mfg. Co., Dept. 5-N, East Pittsburgh, Pa., or call your local:

WESTINGHOUSE OFFICE WESTINGHOUSE AGENT-JOBBER
WESTINGHOUSE INDUSTRIAL AGENT OR DEALER

WESTINGHOUSE 1886 W 1936 GOLDEN JUBILEE

Westinghouse

J 20037

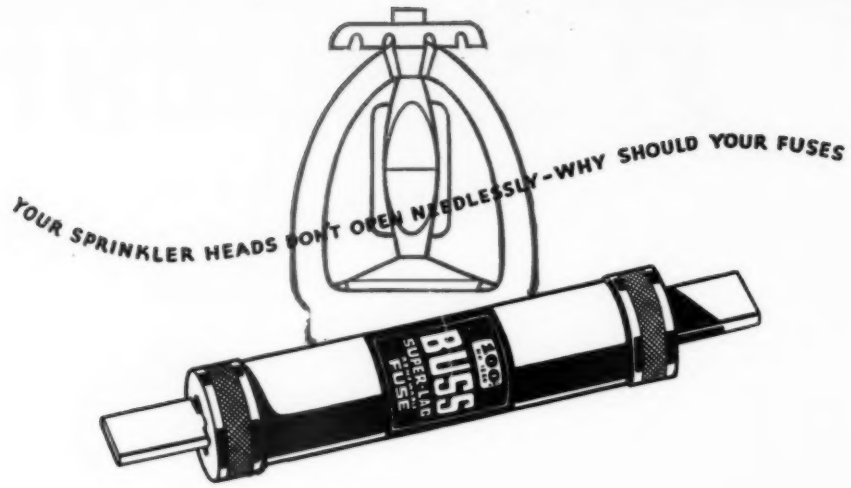
"DE-ION" LINESTARTERS

These were bolted to the inner parapet walls and to the flanged bases of a pressed steel 4-wire service cable bracket. The bracket was fastened to the upper end of the service conduit with U-bolts. This combination support made it unnecessary to drill holes in the outer walls of a vitrified brick auto service station building for installing the service bracket. The conduit braces were also rigidly secured without puncturing the roofing, and eliminated the use of a separate steel post or mast for supporting the service conduit. This work was done by the Charles D. Stempfle Electric Company, Elmira, N. Y.

Advance Meter Board Building for Remodel Jobs

Because an extensive remodeling project in an Atlanta, Ga., commercial block would require the restoration of electric service on short notice, the Peters Electric Company

designed the re-vamped meter board to avoid the need for temporary tenant service connections. The meter board was erected and equipped with wireways and meter service equipment while re-wiring work was under way throughout the offices and stores. By extending a series of 1-in. sub-feeder conduits upward from each meter loop, and elling these conduits outward in their normal direction of routing, it was possible to place any particular office or store in service as soon as its sub-feeder run was completed to the meter board.



FUSES MADE TO PROTECT—NOT TO BLOW

Saved us over $5,000!

— in time and material spoilage

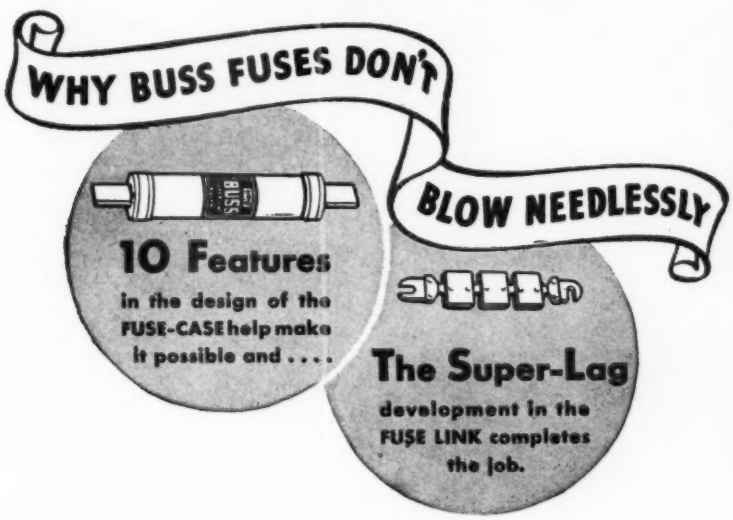
SO SAYS . . . Mr. Robt. E. Bell, Chief Engineer, Martin Dyeing and Finishing Co., Bridgeton, N. J. He continues "We had been having great trouble making the 600 ampere fuses on our main switchboard hold. They blew so frequently that we even resorted to the practice of doubling up on the links to give us a fuse of about 1200 amperes. But we still had a lot of blows that shut down the plant and threw a large body of men out of work.

Finally one of our men suggested trying out some 600 ampere BUSS Super-Lag Fuses. We did — that was three years ago — they haven't failed yet. We attribute this remarkable result to the design of the BUSS One-Piece Link and to the BUSS Super-Lag feature."

GET THE FACTS—*about fuses that . . . .*

• • • *prevent the* RECURRING SHUTDOWNS *caused by* NEEDLESS BLOWS

Like Mr. Bell thousands of executives each year are finding a way to safeguard their equipment against electrical hazards and to protect their plant operation against useless interruptions by using fuses designed to protect—not to blow. These men have found it a money saving investment to investigate . . .

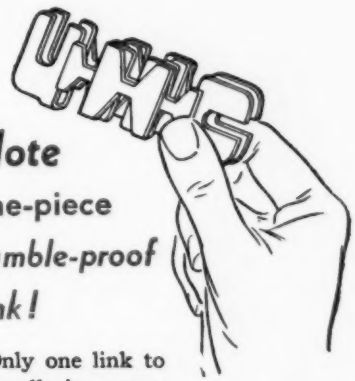


GET THE FACTS

Assuming your interest in getting the facts on the **relation of plant operating costs to fuse design,** we have gone to great lengths in this book to set them up for your consideration.

We will send you a copy free immediately upon receipt of your address. Ask for the Rb book.

BUSSMANN MFG. CO.
2536 W. University St. • St. Louis, Mo.
A division of the McGraw Electric Company



Only one link to handle in renewing—even on the larger sizes.

From 200 ampere up, links have copper terminals and no washers are used with them.

Good contact between the link and the fuse terminals is obviously easy to get when the fuse is renewed.

Maintenance men who have had grief with the old "jig-saw" method of using a number of links and a lot of loose washers to make the larger amperages will welcome the BUSS one-piece link.

They know that heat from poor contact must be prevented from developing between the link and the fuse terminals—or else needless blows and shut down circuits result.

They recognize in the BUSS link a real improvement that helps make possible "Fuses made to protect—not to blow."

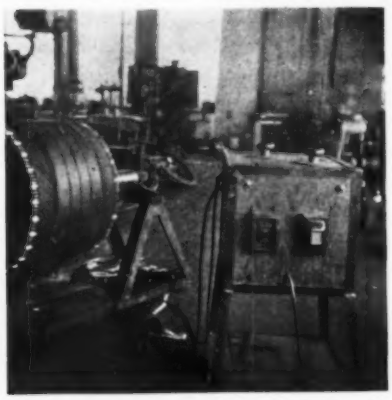
BUSS super-lag FUSES

Service Shop . . . Practice . . . . . .

Portable High Voltage Tester

A specially designed transformer outfit rated at about 3 kva. and mounted in a steel frame plywood cabinet with castor base for applying any desired insulation breakdown voltage up to 10,000 volts has been built by the Armature Winding Company, Charlotte, N. C. This tester is operated from 110 volts by means of a flexible cord. Two radial tap-changing switches are equipped with vertical operating shafts on large insulated hand wheels and pointers which indicate upon brass dials the graduated settings that are obtainable. One dial is marked off in steps of 100 volts from 0 to 1,000. Its switch cuts in the taps from one of ten pancake transformer coils. The second dial and tap-changing switch is marked off 1,000 to 10,000 volts, and cuts in each of the nine remaining coils in steps of 1,000 volts per tap.

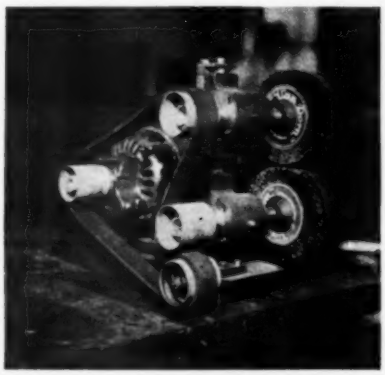
Two line controls are provided in the 110 volt supply circuit in parallel. One is a manually operated safety switch for constant applied testing power, while the second control is a small highly sensitive manually set



trip-free relay. When the relay is used for applying testing current instead of the switch, any short or ground current causes this relay to trip almost instantly. When the live switch is used, a sufficient breakdown surge is said to be present to burn off a No. 8 copper conductor. Two pilot lights are provided, a green pilot which indicates when current has been turned on to the 110-V. supply lead, and a red pilot lamp to indicate when the sensitive relay is in circuit. The testing leads are single conductor flexible cords.

Motor-Driven Wire Cleaner

A small bench-mounted assembly of belt-driven wire wheel brushes for stripping the ends of heavy-gauge loop coils, and for cleaning



flat copper rotor bars that are removed for re-insulating. The brushes are rotated to pull the material away from the operator, thus when a coil-end is held, the wire brushes tend to remove cotton or silk coverings, enamel or other foreign substances.

A 6-in. by 2-in. channel iron base supports the ¼-hp., 1,750 r.p.m. motor and bearing bracket. Three 2½-in. diam., 2½-in. crown face steel pulleys are operated from a 1¼-in. flat belt, two of these pulleys driving 6-in. by 2-in. wire wheel brushes. The ball bearings are 3-in. dust-tight and are fastened to a 12-in. high bracket that was formed from ¼-in. by 2-in. steel, and which has a 7-in. bolting flange on the channel base. The upper bearing is adjustable by providing slotted bolt holes in the bracket or post, and a set screw at the top. A slotted steel guard for the front of this outfit had not yet been installed. This tool was assembled by the Wm. C. Krauth Electric Company, Louisville, Ky.

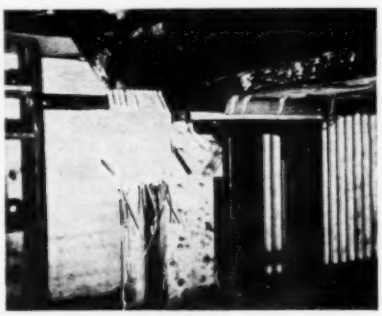
Screw Jack for Removing Stator Cores

An internal expanding jack was made for removing stator cores from solid end-frame motors by the Chau-

tauqua Electric Motor and Repair Corporation of Jamestown, N. Y. A three-member traveling mandrel with an extruded hub or rim is expanded by means of an internal steel spreading cone. This cone travels on a ⅝-in. jackscrew which has a ball-bearing end that rests against the end frame. As the jackscrew is turned by means of a fixed handle on its outer end, the mandrel assembly moves away from the solid end bell. With its rim being engaged over the stator laminations, the entire core is slowly pulled out of the motor frame.

Out-of-the-Way Coil Rack

For installing coils in small stators upon a work-bench, an inexpensive coil rack may be provided which keeps these coils off the bench away



from tools and leaving the bench space free for moving the stator around at will. A 24-in. length of 1¼-in. conduit strapped to the underneath side of the winder's bench, and a 42-in. length of 1-in. conduit to telescope into this sleeve permits

A DEPENDABLE G-E TAPE FOR EVERY ELECTRICAL REQUIREMENT

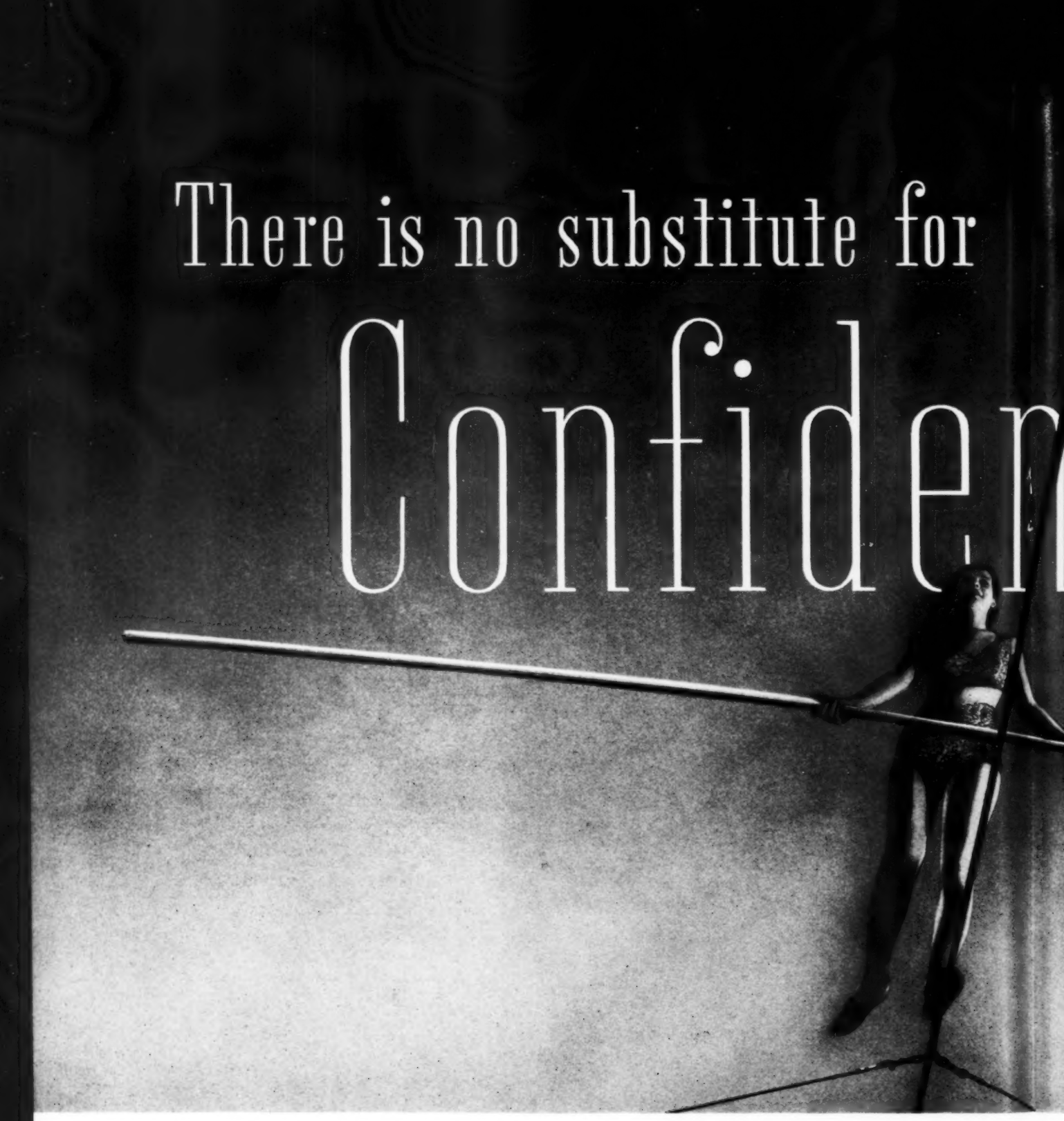
Varnished Cloth Tapes . Cotton Tapes . Asbestos Tapes . Friction Tapes
Rubber Tapes . Weatherproof Binding Tape . Varnished Silk Tape

A complete line of superior tapes built to meet exacting requirements . . . You can now obtain them from your nearest G-E Merchandise Distributor.

GENERAL ELECTRIC

INSULATING MATERIALS

APPLIANCE AND MERCHANDISE DEPT., GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT



Business is built upon confidence....None can long survive without the Confidence of its customers....Fragile and illusive, it is renewed or destroyed with every transaction....The Safecote stamp is a mark of confidence....Safecote wire is bought on Confidence....Safecote performance constantly strengthens this confidence.

ELECTRICAL CONDUCTORS

FLAME RETARDING MOISTURE RESISTING

SAFECOTE

FISHABLE — SLICK FINISH

REG. U.S. PAT. OFF.

U. S. LETTERS PATENT NUMBERS:

1,635,829	1,772,436	1,765,000
1,798,486	1,410,790	1,536,549

OTHER PATENTS PENDING

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Build your business upon the Solid foundation of Safecote Confidence.

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GEORGE C. RICHARDS, LICENSORS' AGENT · 155 EAST 44th ST., NEW YORK CITY

the coils to be laid on the rack. When the coil rack is not needed, it is shoved back under the bench, out of the way until needed again. This method is used by Berger Bros. Electric Motors, Inc., Rochester, N. Y.

Space-Saving Motor Handling

With its larger motors stored in the basement and the dipping vat and oven located in a small room near the receiving dock, the Prussack Electric Company, Brooklyn, N. Y., provided a ½-ton electric hoist and swinging trolley boom that permits

easy handling of motors between the adjoining shop, basement, storage space and oven. Trap doors which cover the hoisting well to the basement are surrounded by a pipe railing guard. This compact arrangement allows the maximum use of space in the shop which is located in a larger room to the left of this area.

Self-Baking for Large Water-Soaked Motors

During the last Florida hurricane a 75 hp., 4,000-volt slip-ring motor belonging to one of the steamship companies was put out of commission by the salty waters that were blown in from Biscayne Bay. The Miami (Fla.) Armature Works restored this motor to normal as follows: The motor was first given a thorough hosing down in the shop with fresh water to remove the salty incrustations. After an 8-hour baking in the oven at 200 deg. F., the rotor was locked with a large pipe wrench, the slip-rings were

TRUMBULL Trouble-free STARTERS

For SMALL MOTORS

CATALOG NO. 2228 . . ACTUAL SIZE

"RB" Tumbler Switches . .

WITHOUT OVERLOAD PROTECTION

Trumbull Tumbler Switches answer all requirements for use as Starters or as positive disconnects in connection with small motor driven machines or automatic apparatus—2 H.P. or less.

The "R.B." is compact (*see illustration*) extremely rugged and provides unusual rupturing capacity because of the self lubricating Roller Type Contacts. Both mechanical and electrical design insure efficient performance, yet the switch is priced for popular appeal.

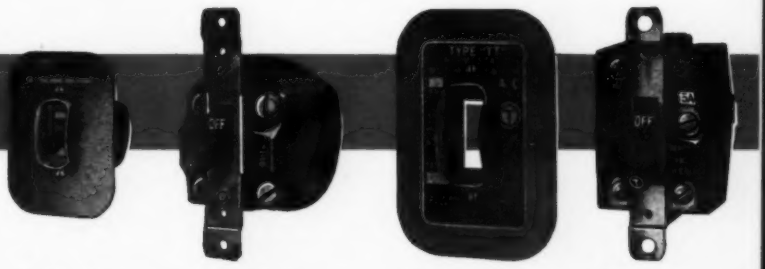
Wiring space is more than ample, unit bases are bakelite, handle guards protect the mechanism and operating lever can be locked "on" or "off." Available in 2, 3 and 4 pole, 30 A., 250V; 5 A., 600V; and 3 way, 10A., 125V; 5A., 250V.

"TT" Thermostatic Tumbler

WITH OVERLOAD PROTECTION

This Thermostatic Starter provides overload protection for motor driven machines 1 H.P. and less. Starter trips free of handle and cannot be held "on" against overload. Stands overload or a heavy starting load for a short time without tripping but *will* trip before damage. Single and Double Pole, 110-220 A.C., 32, 125, 250 D.C. *All switches fit Standard Wall Box.*

"RB" Tumbler Switches are especially adaptable for HEAVY DUTY LIGHTING CIRCUITS



MOTOR DRIVEN MACHINES ON WHICH THESE SWITCHES ARE USED

INDUSTRIAL: Small Lathes, Grinders, Circular Saws, Blowers, Drill Presses, Filing Machines, Addressing Machines, Small Printing Presses, Air Conditioning.

DOMESTIC: Washing Machines, Floor Polishers, Oil Burners, Refrigerators, Stationary Vacuum Cleaners, Ironing Machines, Sewing Machines, Pumps and many others.

R. B. Surface and Flush Types

2 Pole, 3 Pole and 3 way R.B. Starters are made for either Flush or Surface mountings. The Unit only (*shown above*) is ideal for "built-in" control on small machines. Available also in 2, 3 and 4 Pole Float Type for maintaining liquids at definite level in tank.

T. T. Surface and Flush Types

Shown above is the switch unit and the flush plate. The "T.T." switch box (Cat. No. 1106) is only 2⅝" wide x 4 13/16" high, a most compact switch for mounting on small machines. All starters calibrated and checked . . . interchangeable heater units.

THE TRUMBULL ELECTRIC MANUFACTURING CO.

PLAINVILLE, CONNECTICUT — LUDLOW, KENTUCKY

A GENERAL ELECTRIC ORGANIZATION

WRITE FOR FULL PARTICULARS

shorted with jumpers, and 220-volt a.c. current was applied to the stator for 24 hours. The heat thus generated dried the stator coils sufficient to show a normal insulation test upon disconnecting the drying-out hookup. The motor was then impregnated and the new varnish given a standard oven baking, after which the motor was pronounced to be in first-class operating condition again.

Storing Large Reconditioned Motors

Because of the heavy investment that must be made to place large motors in first class condition, and to give them a "like-new" appearance, the Armature Winding Company, Charlotte, N. C., take extra measures to preserve their investment. This group of reconditioned

motors ranging from 125 hp. down have each been wrapped in heavy kraft paper to prevent the accumulation of dust upon them. These motors are each labeled on the outside wrapper, giving the complete name plate rating. Since each motor is set upon its own storage skid, it is an easy matter to move them with heavy floor-jack trucks that are used in the shop.

Oil Pressure for Small Motor Testing

An oil pump, storage tank and pressure gauge outfit is used for loading small reconditioned motors that are being tested out in the service shop of the Eifler Electric Company, Inc., Union City, N. J. The motor is connected with portable leads that are brought from a bank of indicating electrical instruments. An adjustable V-belt drive is provided for the pump. As the motor is started, the pump valves are adjusted for the desired motor load and the electrical instruments indicate how nearly a given motor conforms to its performance rating, and how its starting switch functions.

WHERE QUALITY IS VITAL

● The "service subway" of a hospital is just one of many examples of a place where there can be no "perhaps" or "maybes" as to the dependability of materials and workmanship. The high percentage of front-rank jobs which go to BUCKEYE year after year is eloquent evidence of the enduring quality built into every length of BUCKEYE Conduit.

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Manufacturers of Carbon and Alloy Steels
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Tubular Products, Sheets, Plates, Tin Plate, Bars, Rods, Wire, Nails, Conduit, Unions, Tie Plates and Spikes

Lighting Data

Supplementary Lighting

By Dean M. Warren

General Electric Company,
Nela Park Engineering Dept.,
Cleveland, Ohio

THE necessity for aiding the eyes in every possible way is greater today than ever before, because present day working standards impose a heavy tax on our powers of vision. The question is, how can this strain be relieved?

The science of seeing has an answer. It says that industry needs scientifically prescribed lighting for every seeing task, otherwise human eyes will continue to be sacrificed and human energy wasted.

There are many operations in industry today where the severity of the visual task is such that more light is necessary for easy seeing than can be economically provided by the general lighting system. Such lighting can be provided by using supplementary lighting units located on the machine or at or near the ceiling and so directed as to build up the illumination at the point where additional foot-candles are required.

There are many equipments available for providing this scientifically prescribed lighting. The table contains data on some of them. The foot-candles shown are initial levels obtained at the center of a plane normal to the light beam.

For computing foot-candles at distances other than those shown, use the following formula:

$$FC = \frac{fc \times d^2}{D^2}$$

In this formula fc and d are the foot-candles and distances in feet respectively for a particular reflector.

In providing supplementary lighting, it is first necessary to have a good general system of illumination in order that severe contrasts will not be set up. In no case should a ratio of more than five to one between the supplementary and the general lighting be used. For example, if the general system provided 10 foot-candles, a total of 50 foot-candles could be comfortably provided by the supplementary system.

Where to Use Bowl-Silvered Lamps

Bowl-silvered lamps are really regular Mazda lamps with a mirror like silver coating on the bowl. This coating serves a dual purpose; it protects the eye from contact with the bare bulb and it also serves as a reflecting surface.

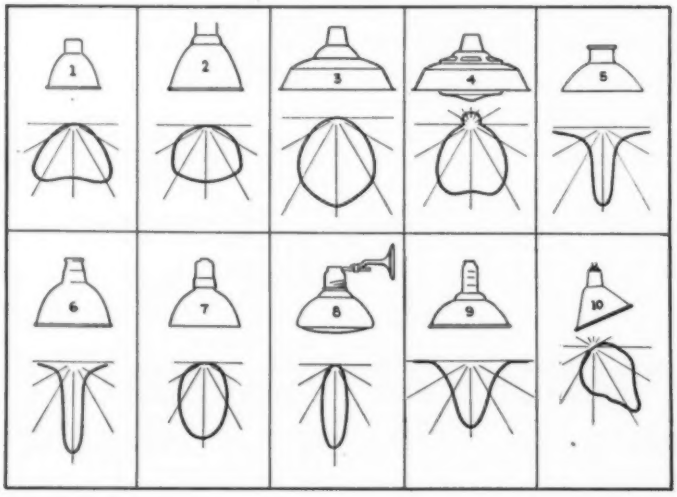
The lamps are intended for use in a pendant base-up position. They are inside-frosted. When used in indirect equipments this frosting does away with ceiling streaks which are caused by fixture chains and hangers and which are particularly noticeable where clear lamps are used.

With a growing appreciation of the need for quality lighting has come a wider acceptance for the soft, shadowless type of lighting produced by indirect equipment, and bowl-silvered lamps are an important factor both in improving existing installations and in new installations.

Where indirect fixtures have become inefficient due to depreciation of the reflecting surface, bowl-silvered lamps may be substituted for the present lamp with a resultant increase in illumination.

Where semi-indirect units are employed there are certain wattage limitations that must be observed, otherwise the unit will be objectionably bright. In those cases, where the maximum wattage is already being used, the illumination may be increased by substituting a bowl-silvered lamp for the present lamp.

Where a new system of indirect lighting is being designed, the use of the bowl-silvered lamp enables the designer to create a fixture of a style harmonious with the interior. He does not have to give major consideration to limitations of reflecting

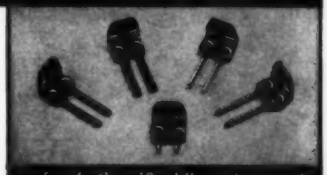


	Wattage	Mounting Height	F.C. on Work
1. Small Deep Bowl	15	6 in.	60
Aluminum Reflector	25	6 in.	100
2. Porcelain Enameled	50	1 ft.	100
Deep Bowl	100	2 ft.	65
3. RLM Dome Reflector	150 W.B.	3 ft.	55
	200 W.B.	3 ft.	85
4. Glassteel Diffuser	200	3 ft.	70
	300	4 ft.	60
5. Mirrored Glass	100	5 ft.	180
Spotlight Reflector	200	10 ft.	125
6. Aluminum Spotlight Reflector with Louvres	150	5 ft.	175
7. Mirrored Glass Floodlight *(Medium Beam)*	200	5 ft.	85
8. Small Portable Aluminum Floodlight *(With cover glass)*	100	5 ft.	55
10. Enameled Steel Floodlight Reflector *(With cover glass)*	200	10 ft.	115
10. Enameled Steel Angle Reflector	200	5 ft.	40

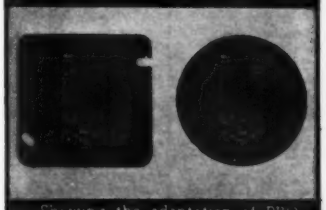
Motor Control *in the* Palm of Your Hand

PROTECTIT
Shown Actual Size

Type "B" PROTECTIT shown above on the left. Type "BH" on the right. Covers removed.



5 of the 19 differently rated heater elements available for Type "BH" PROTECTIT.



Showing the adaptation of PROTECTITS to standard 4" square and

COLT NOARK PROTECTIT

The New Auxiliary Circuit Breaker with a thousand uses!

The PROTECTIT is the newest COLT-NOARK development—a compact, simple switching unit that also provides automatic overload protection. Rugged in construction—built to stand up under continuous operation—and designed to protect motors up to 1 H. P. against damaging overloads. Install the PROTECTIT in homes for operating and protecting small motors on washing machines, oil burners, refrigerators and other electrical appliances. For industrial use install the PROTECTIT on machines and tools for efficient motor control and protection.

***PROTECTIT** in steel cabinet. Flush or surface mounting.*

Two types are available—Type "B" with fixed ampere rating and Type "BH" adapted for using any one of nineteen differently rated heaters. The switching is dualbreak—and automatic overload protection is accomplished by a bi-metallic latch. The Toggle type operating mechanism is unusually simple and the handle entirely trip free. The PROTECTIT is completely enclosed in a rugged, attractive molded casing.

Look into this newest Colt-Noark product — it holds sales and profits for YOU!

COLT'S PATENT FIRE ARMS MFG. CO., ELECTRICAL DIVISION HARTFORD, CONN.

Boston, New York, Chicago and Philadelphia. H. B. Squires Co., Pacific Coast Representative

COLT-NOARK

SWITCHES - MOTOR STARTERS - FUSES

100 Years of Manufacturing Experience is back of Every Colt Built Product

efficiency, because the lamp and reflector are one.

In architectural lighting, where the light is built right into the building proper, this integral reflector-lamp combination makes it possible to obtain higher efficiency than would be possible with a bare lamp alone.

Bowl-silvered lamps can also be used in industry for direct lighting from open-type reflectors. To be used efficiently, however, they should be employed in reflectors which have been designed around these lamps and their characteristic distribution of light. With proper reflector design, the upper portion of the bulb cannot be seen at ordinary viewing angles and direct glare is therefore reduced to a minimum.

Because heat is redirected by the silvering to the base and socket assembly, bowl-silvered lamps are not recommended for use in brass-shell sockets or in equipments where the husk surrounding the socket is so formed as to confine the heat and thus produce base temperatures that are beyond the limits of safety.

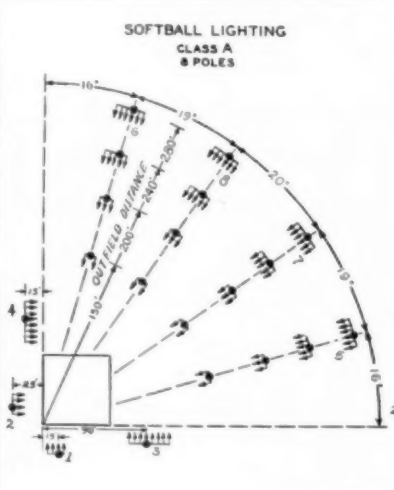
Softball Baseball Requirements

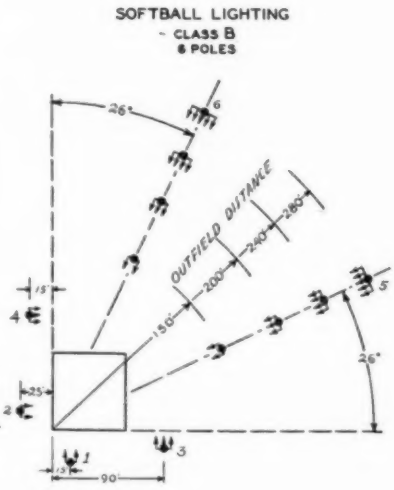
Softball baseball is staging a spectacular comeback. It is being played in country and city alike. Y.M.C.A. and organized recreation centers find it to be one of the best liked of any of the games tried. Hundreds of industrial leagues have been formed, all playing twilight games.

The lighting requirements for this sport are not nearly as rigid as for regular baseball. The field is smaller, also the ball is larger and does not travel nearly so fast as does a regular baseball.

From 18 k.w. to 54 k.w. are required depending on the size of the field, class of play, and size of audience. The diamond has either a 45-ft. or 60-ft. base line. The outfield ranges from 150 ft. or less for the smaller amateur leagues, up to 280 ft. and more for the Class A leagues.

The sketches show pole location and unit arrangement for Class A and Class B fields. Each pole is





Class A 8 Poles

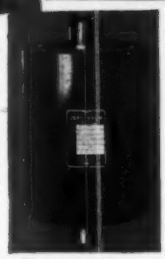
Outfield Distance	150 ft. or Less			150 ft.-200 ft.			200 ft.-240 ft.			240 ft-280 ft.		
Pole Number	1,2	3, 4	5, 6, 7, 8	1,2	3, 4	5, 6, 7, 8	1,2	3, 4	5, 6, 7, 8	1,2	3, 4	5, 6, 7, 8
Minimum Mounting Height	50 ft.	50 ft.		50 ft.	50 ft.		50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.
No. of 1500 Watt Units	2	3	2	2	4	3	3	5	5	4	8	6
Watts per Pole	3,000	4,500	3,000	3,000	6,000	4,500	4,500	7,500	7,500	6,000	12,000	9,000
Total Watts	27,000			36,000			54,000			72,000		

Class B 6 Poles

Outfield Distance	150 ft. or Less		150 ft.-200 ft.		200 ft.-240 ft.			240 ft.-280 ft.		
Pole Number	1, 2, 3, 4	5, 6	1, 2, 3, 4	5, 6	1, 2	3, 4	5, 6	1, 2	3, 4	5, 6
Minimum Mounting Height	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.	50 ft.
No. of 1500 Watt Units	2	2	2	3	2	3	4	2	3	5
Watts per Pole	3,000	3,000	3,000	4,500	3,000	4,500	6,000	3,000	4,500	7,500
Total Watts	18,000		21,000		27,000			30,000		

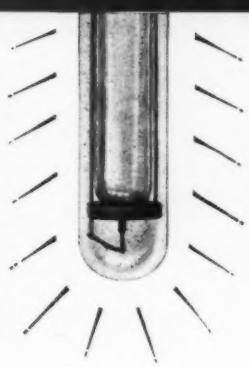
Wall Mounted Type in neat metal case for mounting on wall or post. Bottom is open for ready access to wiring compartment. Snap-on connections make it easy to match primary supply line voltage. Cat. Nos. 232-401,232-411,232-421, 232-431.

USE THESE TRANSFORMERS with 250-watt and 400-watt High Intensity Lamps



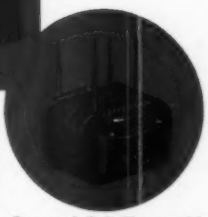
Fixture or Suspension Type for mounting between ceiling and lamp—with standard threaded coupling at each end. Cat. Nos. 232-501, 232-511, 232-521,232-531.

Get Full Rated Capacity Keep Power Costs and Demand Peaks Down



The new mercury vapor lamps give more light per unit of current—reduce electric bills—Jefferson Transformers insure maximum economy.

Weather-proof Typeinone-piece drawn steel case—interior compounded. Connections at bottom. Cat. Nos. 232-601, 232-611, 232-621, 232-631.



Core and Coil Type—which fits in fixture. Vacuumized, impregnated with final double varnish dip, baked. Cat. Nos. 232-301, 232-311, 232-321, 232-331.

More and better light per dollar is available through the new high intensity mercury vapor lamps—and the specially designed Jefferson Transformers insure the full rated capacity and efficiency of these lamps with which they are used.

Meter readings show an extremely low current demand during the starting period and on continuous operation there is a low temperature rise—important advantages in Jefferson Transformer performance.

Jefferson's long specialized experience in the development of transformers for mercury vapor and Neon luminous tubes, sun lamps, street lights and the like, makes possible the high quality special types of transformers and reactors required to insure the greatest lighting efficiency.

Made in types for both 250-watt and 400-watt lamps to suit all applications—generously designed to provide long life and low cost lighting with the new mercury vapor lamps. . . JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago) Illinois. *Canadian Factory:* 535 College St., Toronto.

JEFFERSON ELECTRIC BELLWOOD, ILL.

Ask for Bulletin 351-MV

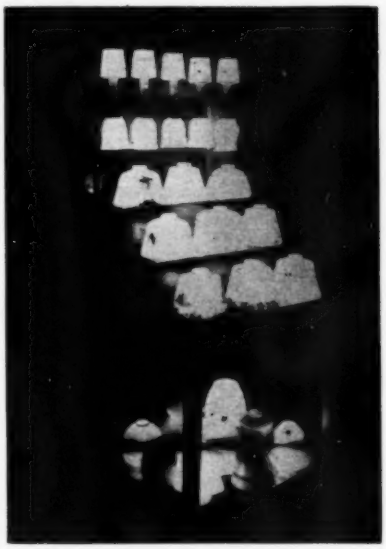
JEFFERSON Mercury Vapor Lamp Transformers

numbered to enable easy reference to the tables which accompany the sketches. Because the play is faster and the attendance larger on Class A fields than on Class B fields, a higher level of illumination is required.

Large open type reflectors are recommended for both class of field. These reflectors should be equipped with 1500-watt Mazda lamps and the lamps should be burned 10 per cent over-voltage.

Illuminated Display Rack for Glass Shades

Because shoppers like to see how ornamental glass shades look with the lamp turned on, the Haley-Stewart Electric Company, Atlanta, Ga., arranged a glassware rack to illuminate internally all of the pieces



displayed upon it. This arrangement eliminates the handling and breakage risk of highly breakable glassware during demonstration, prevents unnecessary soiling in handling, and by their being illuminated in groups, creates an attractive display that helps sell more glassware of high quality.

Made of furniture steel and bronze finished, the display rack stands 58 in. high, 27 in. wide and 24 in. deep. There are three stair-step ledges, each with 8-in. treads and 6-in. risers, the first tread being 30 in. from the floor. This outfit has ten 30-watt lamps in back-to-back sockets at the top, on one flush canopy switch; nine flush sockets and 30-watt lamps on the steps, on one switch; and five sockets at the bottom, on a switch. The control switches are grouped at one side of the rack.

HAZARD INSULATED WIRE WORKS

Manufacturers of Insulated Wire and Cable for Electrical Contractors

Division of

THE OKONITE COMPANY

Factories: Wilkes-Barre, Pa. Passaic, N. J.

Code Chats . . . . .

Questions and answers relating to the interpretation of the National Electrical Code . . .

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Panelboard Bus Protection

Section 1303g reads: "Panel boards supplying only 15-amp. or appliance branch circuits connected to conductors having a current carrying capacity greater than 200 amp. shall have suitable automatic overcurrent protection."

Don't all conductors have to have suitable protection?

This means that the bus bars of a panel board of the type mentioned must have fuse or circuit-breaker protection when connected to feeders of over 200-amp. carrying capacity.

Such protection used to be provided on panel-boards but has not been used very much lately. The Code now again requires it. The rating of the protective device (fuse or circuit-breaker) must be in accordance with the capacity of the bus bars.

All conductors leaving the panel must have their own properly rating protective devices.

Exposed Current Carrying Parts on Fixtures

Section 1403f requires that "fixtures if within reach of grounded surfaces, or if located in windows, shall be so designed and installed that no current carrying parts will normally be exposed externally."

Are there any fixtures made that have exposed current carrying parts and if so how should they be installed to meet this rule?

Many fixtures are equipped with lamp-holders on which the current carrying metal is not entirely covered until the entire fixture is entirely assembled. It would be quite easy to use such a lamp holder in a manner which would leave those current carrying parts exposed and the rule quoted is to provide against this.

Then we also have the lumiline lamp-holder which of itself, has exposed metal parts and which under rule 1403f would have to be installed in a reflector and probably with a glass cover if located within reach of grounded surfaces or in a window. In other locations where out of normal reach they could be left exposed.

Why the precautions for show windows?

Show windows usually contain quite a quantity of flammable material which is so disposed throughout the window as to be conducive to a rapid intense fire, should any spark be presented. Often, too, sufficient metal, whether in the nature of hardware or metallized cloth, is displaced to present a short circuiting hazard.

Paralleling of Cables

A large local office building has a tenant wishing to air condition his place of business, the load to be 810 amp., 3-phase, 3-wire, fed to a switchboard in tenant's space from building switchboard.

If fed in one conduit, it would require 1,400,000 c.m. in 5 in. conduit, but it was desired to run in multiple feeds or two sets of three wires, for which approval can be secured.

It is contended by A that if this feeder is split in two parts that two sets of three 700,000 c.m. are required in order to get the required area as given by 1,400,000 c.m. B contends that since roughly 800 amp. are required, two sets of three 500,000 c.m. would satisfy the requirements. Which is right? There is no question of drop involved.

If 800 amp., rather than 810 amp. per phase is all that is required, two 500,000 c.m. conductors per leg is all that would be required. Each wire of 500,000 c.m. has an allowable carrying capacity of 400 amp. and two of them in parallel would therefore have a capacity of 800 amp.

It is true that a single conductor (made up, of course, of stranded wires) to have a current carrying capacity of 800 (or 810) amp. would have to have an area of 1,400,000 circular mils, but if one wire can carry 400 amp., certainly two together can carry 800 amp. But, if the load requires 810 amp. instead of 800 amp. then full 810-amp. capacity should be provided.

If it is desired to parallel two conductors, special permission should first be obtained from the inspection department having jurisdiction. The inspection department should then insist that each wire be of the same size and the same length, and that each conduit contain a complete set of phase wires. Each of the paralleled wires should be connected at each end into one lug. Twin lugs would be best for this.

Two Kinds of Insulation in Same Conduit

On a 4-wire 3-phase installation I need a capacity of 100 amp. per phase for lighting and 200 amp. per phase for power.

Can I use a feeder of three No. 250,000 c.m. varnished cambric covered wire and one No. 1 rubber covered wire for the neutral in the same conduit in order to take advantage of the larger carrying capacity of the varnished cambric wires?

No. All of the wires should have the same type of insulation.

The 250,000 c.m. rubber covered wire is limited to 250 amp., while 250,000 c.m. varnished cambric is allowed 300 amp.

The 300 amp. required by our correspondent in the 250,000 c.m. wire would produce sufficient heat within the conduit to damage the rubber insulation on the No. 1 rubber covered wire although that No. 1 wire were not carrying current in excess of its allowable capacity.

Capacitors

Section 1102g states that "capacitors shall be installed in the manner provided for other apparatus operating with same voltages and currents."

Does this mean installed like transformers, using vaults, etc. if rating is of same volts and amperes as the transformer, and going by rules 1102-a, b, c,?

The first sentence of rule 1102-g means that capacitors be installed in accordance with the rules of Article

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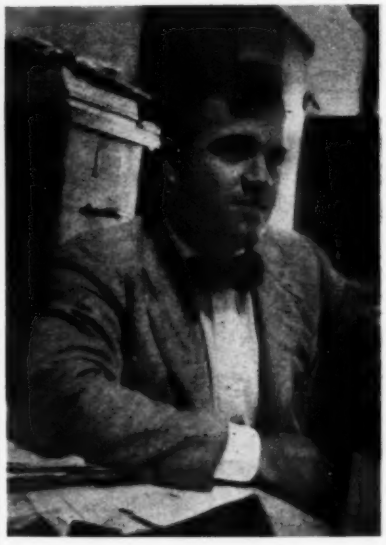
11 which pertain to transformers. When of the oil filled type, they shall meet the requirements for the corresponding capacity or type of transformer. If air cooled, they shall meet the requirements of 1102-d. Of course, Article 11 deals with apparatus connected to voltages of not over 600.

What does last part of this rule mean when it states when a capacitor cannot be placed without being exposed to mechanical injury, it shall be encased in approved metal boxes, unless of the liquid type.

I should think that when they contain oil it would be all the more necessary to enclose them in metal boxes.

This means that a glass or otherwise breakable case is not satisfactory when the capacitor is exposed to mechanical injury, unless enclosed in an outer metal box to provide adequate protection.



GETS "DIVORCE" FROM BUILDING DEPARTMENT: On March 1 the electrical inspection department of Miami, Fla., was set up as a separate department after having been a division of the building department. Ellis C. Knox, chief electrical inspector for the past 4 years, and a member of the department for over 8 years, is pleased of course. But he is more pleased over his department's increased income from permits and miscellaneous fees during Miami's building recovery, which amounted to $8,642 for the last six months of 1935, as compared to $468 for the same period in 1934. Mr. Knox estimates the revenues for the year ending June 30, 1936, to total $16,000, as against operating expenditures for that period amounting to about $9,000. Such good income balance is hoped to allow for more reinspection activity than before. Despite the building rush, Mr. Knox got in several good reinspections, and worked closely with local power company engineers in analyzing the uneconomical use of overloaded commercial wiring systems. A large chain store recently re-wired its Miami store for new lighting and power equipment because of Mr. Knox's close contact with their engineers.

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ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

Lighting

A NEW department is being started this month on lighting where the subject will be treated from its practical rather than its theoretical aspect.

Since every effort will be made to make this new department as valuable to our readers as possible, suggestions are invited as to subjects to be covered and data desired. The editors will also be glad to secure from competent authority answers to any practical lighting problems.

Cost Versus Adequacy

FOR years one group in the electrical industry has striven for lower cost wiring methods on the theory that lower costs will bring more adequately wired homes and, therefore, homes better able to use a wider variety of electrical conveniences. Wiring today probably costs less than it ever did and with what result? Are the houses proportionally better wired?

In some sections where Red Seal wiring has been promoted, the general adequacy of house wiring has been improved, but where there has been no Red Seal program it will be found that the builders are insistent upon the minimum and the public is making no complaint.

We, therefore, come right back to the position we have maintained for years. The price of the wiring method has no relation to the adequacy of the wiring job in a new house.

It would be interesting for someone to make a check on the adequacy of new house wiring in some of the conduit cities and then to make a comparison with places using admittedly lower cost wiring methods. We venture to say that conduit wired homes in Denver or some of the Chicago suburbs are better wired than the armored cable jobs of some Long Island or New Jersey towns.

Even in the wiring of farm buildings on some of the R.E.A. jobs where the lowest cost wiring methods are being used, it has been found necessary to develop some standards of adequacy else the farmers will not get the real benefits of the line extension.

These facts are being pointed out not because we favor one form of wiring over another. We hold no brief for any wiring method. The thing that seems so evident to us is that it is more or less immaterial what form of wiring is installed in a new house. The really important factor so far as adequacy is concerned is selling. A survey of new homes in cities that have or are trying to sell adequate wiring compared with a like number of cities that have done no such selling would undoubtedly prove this point.

Who will make this survey?

What of the Floods

WHAT did the floods do to electrical wiring? Have any lessons been learned that may find their way into the National Electrical Code?

These are questions which the industry will want to know. As this issue was going to press the waters were just returning to the river banks and it was too soon to make more than a hasty appraisal of conditions. This will be found in the Contracting News section of this issue. As soon as the local industry has had a chance to survey the situation and make plans for permanent restoration, we shall make a field investigation.

In the meantime, one cannot help wondering how some of the older devices and equipment is going to survive the immersion in mud and water. Will this old stuff be repaired or will the contractors take the opportunity to sell modern and better operating equipment?

Also how have the raintight fittings, waterproof equipment and moisture resistant wire stood up under actual flood conditions? Laboratory tests are one thing, but nature in the raw working on materials installed under normal conditions of workmanship is something else. Manufacturers might find out things that years of laboratory tests might never reveal. Then again the materials might have come through

fine and this one thing might do more than anything else to clinch their value.

At any event the permanent restoration of service is going to take a long time. Because of the rush it is going to be easy to neglect to sell a modern and adequate installation. The opportunity, however, will be there to convince the public that since rehabilitation must be taken, it will be cheaper in the long run to do it right.

Permit Fees

PERMIT fees based upon the cost of construction upon first thought seem to be a reasonable procedure. A little study, however, will show that the cost of construction is by no means a true measure of the amount of inspection required. In fact, the larger the job, the less the inspection ratio.

Aside from that point, however, is the one of human honesty. Who is to say what the cost of a job is going to be? Will there not be chiseling?

The basis of fees for inspection service has never been entirely satisfactory and undoubtedly some modifications or changes will be welcomed. The cost of construction, however, offers too many objections as a practical basis.

Approved

EVERY now and then some criticism is expressed regarding the manner in which Underwriters' Laboratories protects the subscribers to its service. A lot of money is spent each year by manufacturers for listing electrical products and naturally they feel that every precaution should be taken to see that standards are maintained. For that reason we asked President A. R. Small to tell our readers just what Laboratories does to protect the users of its service and we are pleased to present his story in this issue.

When one reads the extent to which Laboratories goes to protect the symbol of approval, it is not difficult to understand what Mr. Small means when he says that Laboratories has a batting average in the high nineties. On the other hand, unscrupulous manufacturers will try to evade their responsibilities as users of the label. Complaints are then made and the alleged offender is checked up. The rub is that Laboratories does not feel that an offender can be reported, with the result that the complainer has no way of telling what has happened. In other words, Laboratories has been suffering from a lack of publicity which would bring a better appreciation and a more widespread understanding of the value of Laboratories' approval.

Guaranteed Motor Repairs

THE motor service shop industry is facing the problem of unfair competition from the shop that does unreliable work at cut rate prices. To protect themselves as well as the customer the reliable shops feel that they must find some way to identify the better shops or to make a guarantee of repair work that means something to the customer.

The National Industrial Service Association has such a guarantee based upon certain standards, and as identification has an emblem of quality, but it has so far lacked the means to satisfactorily publicize it.

Another answer is municipal licensing. Is this what the service shops want? To be effective licensing must involve inspection. Do shops want to hold up shipment of repair jobs until they have been inspected? Also do the better shops want to face the leveling competition of licensing? And then there is the question as to whether inspection would catch all of the improper work, for certainly shops that made a practice of doing that kind of work would not be disinclined to keep the poor work out of sight.

Is there not, however, another angle to this matter that might offer a solution to the problem? What about the motor manufacturer? Does he not still have an interest in a motor bearing his name plate even though it has been repaired?

There are so many things a shop man can do to alter a motor's performance that it would seem as though the manufacturer would be vitally interested in helping customers get reliable motor repairs. Perhaps the motor manufacturers' section of N.E.M.A. acting jointly with N.I.S.A. can work out a method whereby reliable shops can be certified after they have qualified through some kind of examination or appraisal. It should not be difficult then to find a means for publicizing such a certified shop, both nationally and locally.

N.E.C.A. News..

Material for this department is supplied by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

President	Vice President	General Manager
E. N. Peak	Louis Kalischer	Laurence W. Davis
1603 West Main St.	17 Bergen St.	420 Lexington Avenue
Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

Convention to be in Atlanta in October

Atlanta, Ga., has been selected as the 1936 N.E.C.A. Convention city, the dates to be October 5, 6 and 7.

The Executive Committee which met in Chicago on March 24, 25 and 26 also formulated plans for an active field program in all divisions. The Association was pledged to give full cooperation to the Electrical Industry Promotion Committee for the formation of local industry committees composed of representatives of manufacturers, wholesalers, utilities and contractors to make more effective locally the national programs now being developed for increasing business.

The recommendations of the cost data committee for preparing the Estimating Manual in a new and improved form for use of N.E.C.A. members was approved.

The next meeting of the Executive Committee will be held in the middle of July. The committee attended the national sales conference of the Edison Electric Institute which was addressed by President Earl N. Peak following which the committee attended a formal luncheon of utility executives as guests of the E.E.I.

Condensed Estimating Manual

The Cost Data Committee, under the Chairmanship of Geo. W. Patterson of Toronto, is making an exhaustive study of the N.E.C.A. Estimating Manual in order to put it into the most practical and usable form.

The Los Angeles Branch of the Southern California Chapter, N.E.C.A., in 1935 made an important contribution to this work in their revision of the Manual of Estimating which they published under the title of "Manual of Labor Units for Electrical Estimators." The Los Angeles association have voted unanimously to extend to Mr. Patterson's committee their full co-operation in the further study now being made and in any desired adaption of the form of their manual which can make the work of greatest usefulness to the national membership.

Mr. Patterson's committee, made up of members from every section of the country, invites the co-operation of the entire N.E.C.A. membership in submitting any recommendations or additional data which members can offer from their experience in the use of the Electragists' Manual of Estimating during the past seven years since it was first published. Communications should be addressed to Geo. W. Patterson, Chairman, Cost Data Committee, 9 Richmond Street East, Toronto, Canada.

Coggeshall on Industry Wiring Manual Committee

Allan Coggeshall of New York City has been appointed in place of Robert Goeller as representative of the N.E.C.A. on the special industry committee for the preparation of a Handbook of Wiring Design. Mr. Goeller, who was recently elected president of the New York No. 1 Chapter of the N.E.C.A., has found it necessary to be relieved of this committee assignment.

HEADS FLORIDA STATE ASSOCIATION: Despite an unusually busy fall and winter, because of greater Miami's $14,000,000 building rush, George LaVigne of the Geo. LaVigne Company at Miami takes some time out to make plans for the Florida State Association of Electrical Contractors, of which he is president. Right now he is hoping for a good turnout at the annual state meeting, which was postponed until after the big winter tourist rush.

Directory of Local Associations

Recognizing that there are a large number of local associations of electrical contractors which are not generally known to the industry and therefore are not kept advised of important matters affecting the welfare of their members, the N.E.C.A. is making a complete survey for the preparation of a directory of local associations.

A letter has been sent to more than 12,000 electrical contractors with a business reply card asking them to record the name of the local association to which they belong and the name and address of the president or active executive officer of their association. Upon the completion of this survey and the compilation of the directory, a copy will be sent to all such local associations to encourage a closer contact between associations and the exchange of information.

Electrical contractors are urged to co-operate in this survey by advising the N.E.C.A. Headquarters of full information regarding their own association and also any additional information which they may be able to furnish regarding any other active local associations in their community.

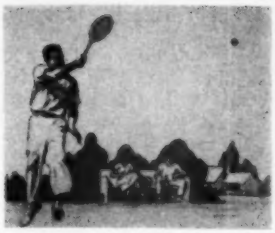
Business Helps Available From N.E.C.A.

The orders received at National Headquarters for estimating and job record forms are an excellent barometer of business conditions throughout the country. The past few months have seen a rapidly increasing demand for these business helps which indicate a substantial increase in the amount of work available for which such estimating and job record forms are needed. Study of the service department records at headquarters shows that there are many members who are not using the business helps available to them and who possibly may not be familiar with all of the forms and materials available.

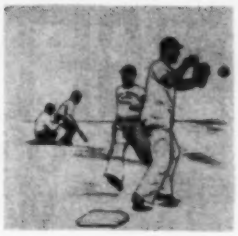
For the larger installation work there are five estimating forms widely used, designated as follows:

Form 1E, Branch Circuit Schedule
Form 2E, Feeder Schedule
Form 3E, Conduit and Wire Summary
Form 4E, Pricing Sheet
Form 5E, Recapitulation Sheet

These forms are put up in pads of 100 each at $1.00 per pad, with a 25 per cent discount to members of the Association. The various job record forms are also in wide demand and these are of service on every type of installation work and size of job. The time cards and job envelopes are in greatest demand but there is a continuous call for payroll records and labor summary sheets and forms for requisition of material and for returned material records and material summary



Nighttime Is Playtime



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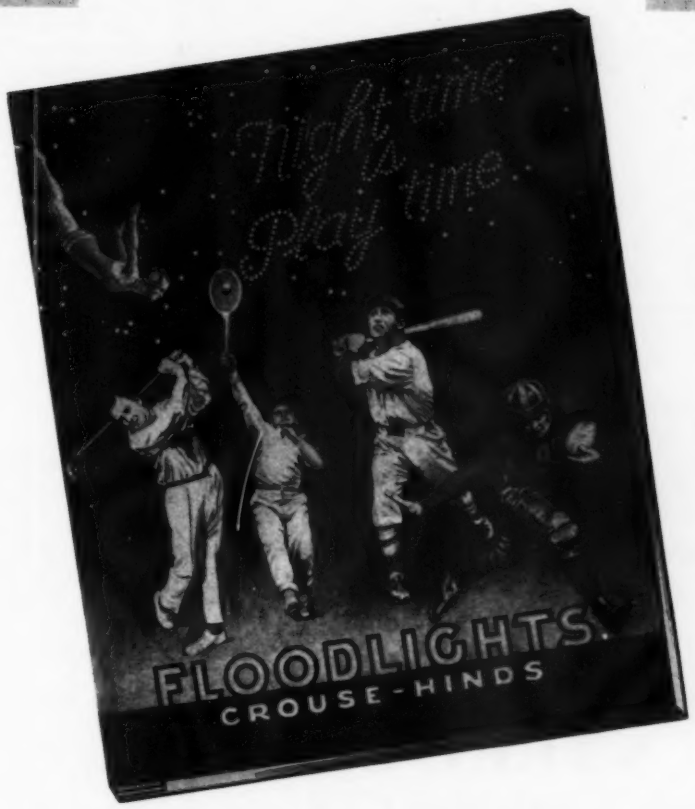

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sheets. Many contractors use regularly the original universal estimate sheets, which are particularly adaptable to jobs where all of the materials and labor costs can be estimated on a single page providing about fifty lines for the estimate and with a complete description of the job at the head of the estimate. This form is one of the oldest adopted by the Association and it carries in the left-hand margin a "reminder column" in which are listed nearly one hundred materials and devices commonly needed on jobs which the estimator may check to be sure that no item has been omitted from his estimate. Another valuable form widely used is a uniform proposal blank particularly adapted to residence wiring and which includes in the proposal the essential conditions of the contract as the basis of the contractor's proposal to the customer.

All of these forms are available to any electrical contractor at nominal prices and with discounts which average 25 per cent to members of the N.E.C.A. Any electrical contractor desiring to receive samples of these forms with a complete price list may obtain same by writing to N.E.C.A. Headquarters.

Simplified Accounting Widely Acclaimed

Not only have members of the N.E.C.A. indicated their enthusiasm for the new Simplified Business Record System through the large number of requests received for same, but many letters have been received from jobbers and other branches of the industry expressing interest in the important service which this simplified accounting method is bringing to the smaller and medium sized electrical contractors in providing them with a complete and accurate knowledge of their business with a minimum of bookkeeping effort. The Simplified Business Record System has come to the attention of other industries and an interesting letter has been received at N.E.C.A. Headquarters from the president of a national association representing another division of the construction industry, who wrote in part as follows:

> "I have just seen your new Simplified Business Record System for Electrical Contractors and I desire to compliment you on the splendid job which your Association has done. It has always been our belief that one of the main problems of our National Association was to set up a proper accounting system simplified enough so that the members can make full use of same. Yours is the first that the writer has viewed which really makes a simplified job of accounting."

The Simplified Business Record System is not offered for sale but is furnished free to all members of the N.E.C.A. requesting same. Requests

for purchase of the Simplified Business Record System without membership should not be made as such orders can not be recognized. The furnishing of this system is but one of the many services available to N.E.C.A. members and any electrical contractor not at present a National member should immediately write for full information regarding membership.

N.E.C.A. Officers Covering 10,000 Miles

President Earl N. Peak and General Manager L. W. Davis are both setting out this month on seven-weeks trips which will have a combined coverage of over 10,400 miles in their visits to 55 cities in 21 states.

Mr. Peak's trip started from Marshalltown on April 4 and by the time of his return on May 23 he will have covered 6,200 miles and visited 25 cities in the following 12 states and provinces of Canada: Missouri, Oklahoma, Texas, Arizona, California, Oregon, Washington, British Columbia, Idaho, Montana, Utah, Colorado and Nebraska.

Mr. Davis will start on a southern trip on April 15 which will take him over 4,200 miles and with visits to 30 cities in 9 states. His first stop will be for two days in New Orleans on April 21 and 22, where he will have conferences with the electrical contractors and be the speaker at an industry dinner meeting on the evening of April 21 sponsored by the Electrical Contractors Division of the New Orleans Electrical Association. From there he will make stops in Mississippi and Tennessee, following which his schedule will be approximately as follows: Week of April 27 in Virginia; week of May 4 in North Carolina; week of May 12, South Carolina; week of May 18, Florida; week of May 25, Georgia, and week of May 31, Alabama.

HEADS JACKSONVILLE GROUP: There are twenty-seven members in the Jacksonville, Fla., local association, with special committees working on wholesaler relations, cost data, legislation and labor relations. George E. Gormly of the Service Electric Company was re-elected president of this active group for 1936. Mr. Gormly is enthusiastic over the way the local membership is cooperating to better its conditions.

Contracting .... News .....

Rewiring Gets Under Way in the Flooded Areas

As the water receded in the flooded districts of Pittsburgh, Pa. and Hartford, Conn., the two most seriously affected industrial centers, late reports indicate that it would be some time before permanent restoration work will be anywhere near complete. A report as of March 24 from Joseph P. Rohan, electrical inspector of Hartford, is about as follows:

Flood waters had only receded on the morning of March 24 to a point where inspections could be made. An extra inspector force of twenty-seven men was sent into the flooded areas on this date for the purpose of getting all current cut out of the water soaked portions of building wiring. The men who were deputized for this emergency service were quickly recruited from the ranks of contractors and electrical workers who beause of their practical experience were better able to enter abandoned premises and make their investigations of eletrical equipment with minimum danger of personal shock hazard, and with reasonable accuracy as to those portions of wiring systems affected by water.

It is yet too early for Inspector Rohan to report on the procedure that is being planned for the replacement of damaged wiring systems. Wherever possible, motors and other equipment have been removed for cleaning, drying out and revarnishing. In certain residential localities the inspectors have found homes in which the basements only had been flooded. Here some occupants were trying to use the wiring system. Because of possible fire and shock hazards they have attempted to bring about the isolation of all such cases that could be found.

A block by block survey of Hartford's commercial and industrial areas is expected to take a week or more before the extent and nature of wiring replacements may be learned.

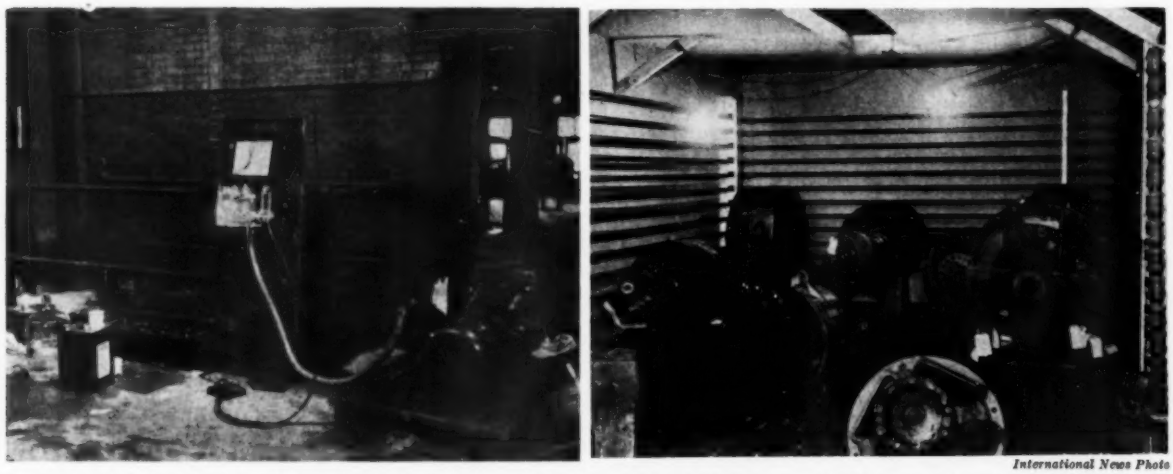
The inspection department will generally require the removal of conductors from all raceways which were at or below the high water mark. After a thorough swabbing out of these raceways, it is Mr. Rohan's opinion that new conductors will be installed in nearly all cases. Because of the urgent need for restoring permanent service, he did not anticipate many cases where feeder cables would be pulled out, cleaned off and dried, for reinstallation in the swabbed feeder conduits.

In Pittsburgh, Pa. Frank J. Walsh, chief electrical inspector, also has a large extra force that are operating in a somewhat similar manner to the procedure at Hartford, excepting that the Bureau of Mines has established a general order which forbids the use of any electrical equipment in the flooded areas until after its inspection staff have made tests to determine the presence of dangerous gases. All flooded wiring systems in Pittsburgh are being completely cut off from the remainder of the system by the electrical inspection force. The flooded or water soaked sections are tagged to prevent their illegal use until further detailed inspections can be made.

At the present time Mr. Walsh reports a great amount of temporary work being done to serve the unharmed portions of buildings. Various department stores and wholesale organizations have been lucky enough to secure emergency lighting outfits which have given them enough current for work lights while the tremendous clean up task is going on.

It is Mr. Walsh's opinion it will be a year or more before the damaged wiring systems will have been completely restored. At the present time some effective drying out operations have been conducted at large distribution panels and switch boards through the use of salamanders or other auxiliary heating devices. Because of the length of time that some buildings were under water, the accumulations of silt have served to seal in large quantities of water in riser conduits, junction boxes and the like. After the main flood water had receded, inspectors and mechanics alike are entering all buildings that are accessible, to drain all such pockets of water as quickly as possible.

From the scattered attempts that have been made to date toward the replacement of water soaked wiring,



International News Photo

Emergency lighting (left) in the Pittsburgh Area. At the right is a special drying oven at the Homewood works of Westinghouse, using steam heat at 1.75 pounds pressure.

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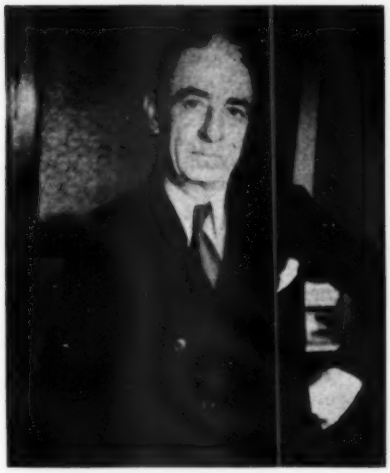
the following general operations are said by Mr. Walsh to be found necessary. (1) Removal of all water soaked cables from raceways. (2) Drain, swab and dry out all conduits. (3) Clean out and dry all junction boxes, panel boards, etc. (4) Disassemble, clean and dry switch gear and distribution equipment. (5) Replace or abandon entirely, with few exceptions, all water soaked armored cable. (6) Remove and install new wiring devices. (7) Disassemble, dry, rewire and resocket lighting fixtures, except for such types which by their design are not seriously affected by moisture.

According to Harry Barton, Hess and Barton, Pittsburgh electrical contractors, approximately 2,000 Pittsburgh buildings including stores, offices and theaters will need extensive electrical repairs because of flood damages. Complete electrical equipment from many of the water-soaked industrial plants will have to be taken out, dried, cleaned and repaired before their operations can be restored.

Cannot Use Label on Used Equipment

The right of Underwriters' Laboratories to legal protection against counterfeiting and unauthorized use of the label was established on February 14, by Judge Caffey in the United States District Court, Southern District of New York in an action, brought by Laboratories, against Irving Kandell, a dealer in second-hand electrical supplies. It was brought out in the case that the defendant had affixed counterfeit labels to reconditioned electric fuses to further their sale. Permission of Underwriters' Laboratories

FULL-TIME SECRETARY: An important service is rendered to members of the Electrical Contractors Association of Cincinnati, O., by Katherine R. Lanier, full-time secretary for the past three and one half years. Miss Lanier looks after the details of new, delinquent and bad accounts, as a confidential clearing depot between the reporting members and commercial credit information bureaus, in addition to the other routine association matters. She served as secretary and treasurer of the L.A.C. under NRA.



ACTIVE FOR LEGISLATION: John D. Turner of Birmingham, Ala., executive secretary of the Jefferson County Chapter, N.E.C.A., is encouraged by developments since a state licensing movement was begun on February 1. He reports the State fire marshal is cooperating to secure the passage of the proposed bill that would set up statewide contractor licensing, and sales control of approved materials. Mr. Turner came with the chapter in June, 1934, and continues to devote his full time to association duties. He states that weekly meetings are being held by the chapter in an effort to solidify local contractor interest.

to use the label had not been sought. The defendant was permanently enjoined from using the label in any form on any devices reconditioned by him and offered for resale.

To Take Action on New Code Arrangement

The proposed new form and arrangement of the National Electrical Code which a special committee, under the chairmanship of Dr. M. G. Lloyd of the Bureau of Standards, has been developing for the past year, will be presented at the special meeting of the Electrical Committee, N.F.P.A., to be held at the Lake Shore Athletic Club, Chicago, on April 22 to 24, for consideration and action.

An analysis of the proposed new form of the Code will be found on pages 9 and 10 of this issue.

N.I.S.A. Convention Set for Cincinnati

A very practical program has been developed for the annual convention of the National Industrial Service Association to be held at the Cincinnati Club, Cincinnati, Ohio, April 27, 28 and 29. Reservations can be made direct to the club at Eighth and Race Streets, or to the National office at 500 Fifth Avenue, New York City.

The tentative list of subjects to be covered at the convention include: Shop practices, personality in shop

service and sales methods, relation of service shop to industry, pricing schedules, motor winding data, manufacturers' sales policy on new motors, certified plan for electrical repairs, guarantees, rebuilt motor exchange service, ratio coil prices to rewind prices, the question of peddling overstocks of new motors.

Model State Law Ready

A new Model State Electrical Law has recently been published by the Uniform Legislation Department of N.E.M.A., and will be made available to various branches of the electrical industry organized within a state where said legislation is desired by the industry.

This new model law has been set up in a 24-page publication containing the various provisions of such a law by sections. Opposite each section is given a complete explanation of the purposes of and reasons for that section so that those interested may decide whether any section should be included or not in drafting any particular state law.

Labor Policy for Northern California

A labor policy for the various associations affiliated with the Northern California Chapter, N.E.C.A., was adopted at the quarterly chapter meeting held at Fresno on February 21

NASHVILLE PIONEERS: John B. Mullen of Mullen & Engles had "just dropped in" for a chat with J. P. Lawrence (left) at Herbrick & Lawrence headquarters in Nashville, Tenn., when these two pioneers were asked to talk about their early experiences in the industry. It seems that Mr. Lawrence has the edge, as he became a contractor in 1891, after taking up the trade in 1884. Mr. Mullen started in at Nashville in 1903—but wait. In 1882 Mullen did one of the South's most daring floodlighting, or something, jobs by putting three 1,200 c.p. carbon lamps atop the dome of Tennessee's capitol. Then Mr. Lawrence countered by telling of his feverish efforts at keeping the wobbly generator going, because it was temporarily installed upon rather uncertain ground in a livery stable.

and 22. This policy sets forth the effect of individual labor agreements in one locality upon neighboring localities, suggests that any changes in hours, wages and working conditions be conducted in conjunction with representative employers of other related crafts to promote uniformity of hours and starting time, recommends return to the 8-hour day because of the growing shortage of skilled labor, and urges that individual association dealings with individual locals of the labor organization be discouraged.

Safety Show Popular

The second annual safety show held by the Green Bay (Wis.) Electrical League drew an attendance of more than three thousand during the three days, March 4, 5 and 6, that it was held. In addition to a safety show, exhibits were held this year of appliances and lighting equipment.

The demonstration of electrical hazards in the home were conducted by Fire Chief R. H. Drum, City Electrician H. J. Bero and Glenn Fiedler, secretary of the league.

The safety demonstrations took place in a model living room, kitchen and bath room set up on the stage, where the dangers of grounds, over fusing, over loaded and defective wiring and appliances were shown in action.

Each one attending the show was given a pamphlet on the care and operation of fuses.

New Minnesota Officers

The newly elected officers of the Minnesota Electrical Association are: Ray Mrachek, Rochester, president; Sam Newstone, Montevideo, vice-president; and W. A. Ritt, St. Peter, secretary-treasurer. The executive committeemen are: Louis H. Gordon, Albert Lea; C. J. Ahlers, Red Wing; J. W. Hruska, Mankato; E. J. Micka, Hibbing; John Ellenbecker, St. Cloud; W. S. Johnson. Duluth; Leo P. Kemp, Winona; Ed Karst, Fergus Falls and C. W. Turner, Faribault.

Rural Electrification Contracts

An important definition of R.E.A. policy governing contractors' bids on rural electrification projects is shown by the following letter addressed to electrical contractors on February 20 by the South Carolina R.E.A.

"This is to advise that the Rural Electrification Administration in Washington has rejected all bids which we have received to date for the furnishing of labor only for the construction of our rural lines.

"In the future bids will be requested on a basis of the contractor's doing all necessary clearing, and furnishing of all material, labor, and other necessities for the complete construction of a project, in other words a turn-key job."

A Roll o' Tape

Field notes about men of the contracting shop, and inspection branches of the industry

A KITCHEN modernization poster displayed by the Perry Electric Co., Hartford, Conn., reads: "Plan for your modernized kitchen now. We offer the services of an experienced architect, ask for details."

SEVERAL motor service shops in Savannah, Ga., have made inexpensive, but roomy electrically-heated baking ovens of wood, using heavy sheets of asbestos for inner lining.

KEEP a close eye on the appearance of your tools and your rolling stock, advises W. W. (Bob) Ingalls, Miami, Fla. With four new bright-red trucks, and all tool boxes, ladders and other visible tools kept enameled to match, the W. W. Ingalls Electric Co. outfits make a good impression along the busy streets of greater Miami.

AMONG the graduate electrical engineers in the industrial contracting-service shop ranks we find that Frank W. Willey, Willey-Wray Electric Co., of Cincinnati, O., was one of the three men to graduate from the first electrical engineering class at M.I.T. Mr. Willey is a busy man in Cincinnati's civic life as a member of that city's board of education, and does more than his share in industry circles as president of N.I.S.A.

THE confusing arrangement of streets in certain parts of Atlanta, Ga., causes no end of trouble for electrical inspectors when permit addresses are turned in carelessly by contractors. To lessen "wild-goose" inspector trips and to speed up clearances for customers, the Atlanta electrical inspection department occasionally exercises its right to impound permits that are wrongly addressed. When this happens the erring contractor must buy a new permit for the job. He eventually gets back his first permit fee.

WHEN the judge says "30 days" 'n Miami, Fla., it means just that, according to Ellis C. Knox, chief electrical inspector, and "runner-down" of wiring bootleggers.

AFTER the Electrical Engineering and Repair Co., Atlanta, Ga., went into air conditioning and built their own full-fledged demonstration plant for their office, Chas. A. Mayer found it hard to get visiting peddlers to venture out upon sweltering sidewalks.

EACH outside employee of the Geo. La Vigne Co., Miami, Fla., receives among other things, two new khaki uniforms at Christmas time. These bear the firm letters on the back of course. Replacements are furnished as needed during the year at half their actual cost.

WHILE the county electrical inspector was nursing a broken leg, several Nashville, Tenn., electrical contractors volunteered to keep up his work. J. P. Lawrence of Herbrick & Lawrence, pioneers among Nashville contractors, found that 22 jobs out of 25 assigned to him for inspection had to be drastically revised to meet his approval.

WHAT the buyer really pays for a completed "gyp" job recently came to a head at Titusville, Fla. Thomas O'Flanagan found his customer lined up to buy wiring materials at wholesale through the town druggist, and a wireman offered labor at 50 cents an hour. The O'Flanagan Electric Co. bid of $56, which included labor at $1.25 per hour to the customer, was not accepted. Final results, O'Flanagan had to overhaul the job, although the owner actually paid out $66 for the original "gyp" job.

WHILE discussing adequate residence outlets with John A. Becker of Al Becker Sons, Inc., Cincinnati, O., one learns of a large home which this company began wiring for less than $4,000, only to wind up in a $7,500 job. Mr. Becker states that among the additions there were 72 convenience outlets. This company was started over 50 years ago by the deceased Al Becker. His sons John A. and F. William have carried on with this business.

SOMETHING for the boys to shoot at, says C. H. (Charley) Whitehead, engineer for Electrical Engineering & Repair Co., Atlanta, Ga., is a recent crew record, wherein two journeymen and a helper working an 8-hour night shift (11 p.m. to 7 a.m.) in a Georgia cotton mill modernization job, installed 72 ceiling outlets and 1,370 ft. of assorted ½-in. and ¾-in. of electric metallic tubing working on stepladders over rows of spinning machinery. This time included putting

ABOUT 50,000 car miles per year is the average for J. Howard Lott of the Orland (Fla.) Armature Works, Inc. Business is good, says Mr. Lott, but you've got to go out and find it.

TUMBLER switches controlling hospital ward night lights were placed outside the rooms to isolate the click from patients in a recent job installed by William Hepburn & Co., Miami, Fla.

"THE Shop on Wheels" truck sign identifies a contracting business that was built up in Jacksonville, Fla. by D. L. (Dixie) Carroll when a broken ankle caused him to quit big league baseball and become an electrical contractor. Dixie is doing well and gives much of his time to local association welfare.

AIDING in the hoarding of gold to the tune of a $43,000 wiring contract is a pleasant task for Gilbert Thirlwell, Marine Electric Co., Louisville, Ky. The Federal Bullion Depository at Ft. Knox, Ky., has everything electrical including special phones, watchman and vault signals, a complete radio receiving and transmitting outfit, some 4,000-volt transmission line, etc.

TO curb "gyp" motor repair work, S. H. Browning of the Cleveland Electric Co., Atlanta, Ga., has induced motor owners to saw or clip off the ends of windings on motors before they call for bids. Mr. Browning reports this to be a certain cure for those who aim to "doctor" or short out coils on cut-price quotations that are presumably made on complete rewind requests.

WHICH is correct for concrete construction—leave outlet box screws in the ears or remove them? Jack M. Eaton of the Peters Electric Co., Atlanta, Ga. removes them when he sets his boxes in the forms, claiming that they often become rusted in so tight before wiring devices or plaster covers are installed, as to cause expensive fussing with the screws.

TO keep up a steady program of reinspection work, while also having all new jobs to inspect, Robert E. Barry, chief electrical inspector of Louisville, Ky. and his two assistants worked evenings the past two years. The average 4-story commercial building was found to require about

three hours for complete reinspection, and one-half hour in dictating the violation report to the secretary on the following morning. Then as many as five trips to the job with various contractor bidders, and two or more final inspection trips—all for an average inspection fee of $10 to $15.

IN the absence of other reports, first honors for using H.I.M.V. illumination in a privately-owned motor service shop must be given to C. S. Dyer, Dyer Electric Co., Birmingham,

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COUNTY inspections for a nominal fee are made possible through an arrangement with D. B. McCracken, electrical inspector of Savannah, Ga. This work is done outside of city working hours, and on Saturday afternoons.

IF a church re-wiring job looks inaccessible for running concealed work to high-up chandelier outlets, try cutting into the roof. This recently helped solve a mean problem for E. A. Leonard of the Peerless Electric Co., Savannah, Ga.

NOT to be outdone by federal alphabetical "bureaucracy," Louisville, Ky. is perhaps outstanding in its array of inter-linked organizations and bureaus, all functioning to some degree in bringing about better electrical conditions for that locality. These organizations are about as follows: (E.L.L.) Electric League of Louisville, comprosing nine industry divisions; (E. C.H.L.) Electrical Clearing House of Louisville, Inc., for contractors, inspectors, workmen and suppliers to discuss in open forum their code and other problems of the trade; (S.I.B.) State Inspection Bureau, for conducting electrical inspections beyond the boundaries of Louisville city limits; (K.E.I.B.) Kentucky Electrical Inspection Bureau, for privately inspecting new wiring for architects or owners, to determine whether plans and specifications have been complied with, and to determine whether such work meets code and insurance rating requirements; (R.W.C.) Ray W. Chanaberry, Inc., a privately operated electrical planning and engineering bureau, which also prepares for electrical contractors material take-offs and labor estimates at nominal cost; (K.A.B.) Kentucky Actuarial Bureau, the state rating bureau with whom several of the foregoing organizations cooperate in planning work to obtain wiring installations at low insurance rates; (W.A.B.) Western Actuarial Bureau, to whom K.A.B. reports as a state unit of this interstate rating organization; and last, but far from least, the municipal electrical inspection department of Louisville, with a fine record for two years of constructive reinspection effort.

Trade Notes . .

The Steelduct Co. announces the removal of its general offices to the Republic Bldg., Youngstown, O.

Graybar Electric Co. announces the appointment of K. L. Thielscher as divisional manager of its Buffalo and Rochester, N. Y., offices. J. L. Murphy who has been sales manager at Buffalo is being transferred to the New York office as assistant merchandising manager.

Pratt Industries, Inc., has taken over the entire business of the Pratt Chuck Co., of Frankfort, N. Y., and will operate from the same offices and plant. Winthrop T. Scarritt is president and treasurer of the new organization; George Sicard, vice-president and director of sales; and Alexander Pirnie, secretary.

Curtis Lighting, Inc., Chicago, Ill., announces the appointment of Lester H. Graves, formerly vice-president of Curtis Lighting of New York, Inc., as a vice-president of Curtis Lighting, Inc., to be resident in New York City. Mr. Graves has been assigned important national duties with the division headed by Norman B. Hickox, vice-president.

Trade . . . . . .

Literature . . .

Window Lighting: An illustrated folder describing Sterling "Lite-Flo" show window reflectors. Reflector and Illuminating Co., Chicago, Ill.

Vacu-Break Switches: A 16-page bulletin illustrating and describing in detail the three types of Vacu-Break safety switches. Bull Dog Electric Products Co., Detroit, Mich.

Coil Winder Drive: Illustrated descriptive sheet giving details of a foot-operated variable-speed coil winding drive. Ideal Commutator Dresser Co., Sycamore, Ill.

H.I.M.V. Accessories: Transformers and reactors of various mounting types for use with mercury vapor lamps are described in catalog sheet 351-MV. Jefferson Electric Co., Bellwood, Ill.

H.I.M.V. Lighting Equipment: A description of the 400 watt mercury vapor lamp, ballast equipment, installation data, and tables of recommended f.c. illumination values are included with a 10-page presentation of Wheeler

New Products . for April . . . .

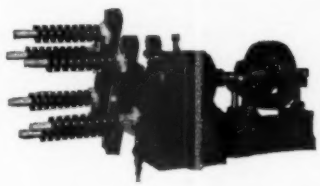
Photoelectric Relay

A photo electric relay using "Visitron" photo tubes, which because of a 3-in. lens aperture is said to offer increased sensitivity. The No. 5351-D relay is designed for use on 110-120 V., 50-60 cy. current.

It may be had for other a.c. voltages and frequencies, also with 2-in. lenses; with rectangular apertures and no lenses; and with no aperatures, for use with separate photo tube housings. The unit is said to be suitable for individual installations. G-M Laboratories, Inc., Chicago, Ill.

Coil Winder Drive

A compact foot-operated variable speed drive for coil winding heads, which may be mounted upon a shop bench or pedestal, and which can be driven by an individual constant speed motor, or belted to a line shaft. The operator of this drive may by operating the foot lever, start the drive or vary its speed to suit his job. An asbestos-lined brake stops the winding head when the foot lever is released, and also holds the wire being wound under tension. Approximately ½ hp. is required for this drive, which may be any standard constant speed motor. An



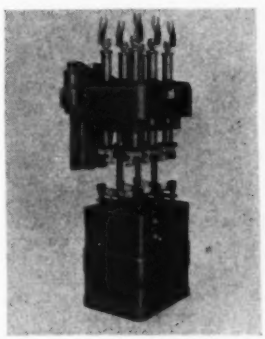
automatic revolution counter, with quick reset to zero, is mounted in plain view of operator. This drive is designed for an input speed of 1,100 r.p.m., and output speed of 200 r.p.m. It has an 8-in. diam. by 2½-in. crown face driving pulley, a face plate for mounting the winding head, foot lever control, but no motor or drive belt. Weight 105 lb. Ideal Commutator Dresser Co., Sycamore, Ill.

Individual Circuit Breakers

Enclosed "De-Ion" Flipon circuit breakers are available in 15 to 50-amp ratings for flush or surface installation as individual units to provide automatic fuseless protection and control for lighting and single-phase motor circuits, or other similar applications. The mechanism is totally enclosed in moulded composition, its sealed calibration is claimed to be non-tamperable, and the breaker is said to operate without undue flash or noise. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

High-Speed Circuit Breaker

Type DX-20 indoor oil circuit breakers are equipped with expulsion ports for high-speed interruption. Furnished for 600 amps. at 15 kv., 1,200



amps. at 7.5 kv., and 2,000 amps. at 5 kv., and rated 50,000 k.v.a. interrupting capacity. This line is said to be flexible in its mounting arrangements and may be manually, solenoid or motor operated. Additional features are: High-speed enclosed mechanism; sturdy frame construction with deep overhanging flange; all poles in one tank; oil and gas separator; and, heavy arcing contacts of large thermal absorption capacity. Condit Electrical Manufacturing Corp., Boston, Mass.

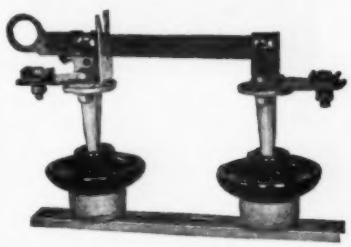
Solderless Connectors

The G & R line of solderless connectors are designed for joining to-

gether combinations of Nos. 14, 16 and 18 solid and stranded wires. A hexagon-shaped and tapered molded case provides an insulated outer covering for a machined brass tubing in which the conductors are held. Good mechanical holding action is said to be obtained by a chuck-like action of this tubing assembly and its serrated jaws. G & R Electric Co., Wilkinsburg, Pa.

Outdoor Disconnect Switch

Light-duty outdoor hook-operated disconnecting switches for rural lines, small industrial substations and other applications, are available in 200 and 400-amp.



ratings at 7,500 and 15,000 volts. Type FD-102 is for vertical, and Type FD-103 is for underhung mounting. Galvanized channel bases for this switch are slotted to make it suitable for pole-top crossarms. Other details of design are: Tongue contact, with double type blade fabricated of hard-drawn copper; a simple blade latch that is said to assure latching in closed position; and clamp type solderless connections. General Electric Co., Schenectady, N. Y.

Protective Coating

A protective coating of a paint-like nature for application to metal, concrete, wood and other surfaces that is claimed to resist such acids as sulphuric, hydrochloric, nitric, lactic and acetic; also alkalis, brines, gasoline, and fruit or food acids. It is known as Plicote, and can be had in nine colors, may be applied with spray, brush or by dipping, and is said to cover 500 to 600 sq.ft. of surface per gal. Plicote is claimed to be resistant to heat deterioration and to stand up to 300 deg. F. The Watson-Standard Co., Pittsburgh, Pa.

Transformers for H.I.M.V. Lamps

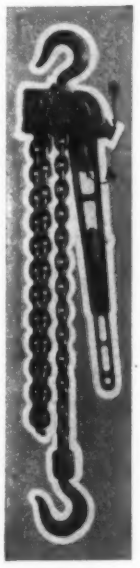
Transformers and reactors in four distinct styles, to be used in operating H.I.M.V. lamps. Available for indoor

wall mounting, indoor suspension or fixture type, and also weatherproof type. A snap-on self-locking type plug-and-jack primary connection is featured in the wall mounting unit, for changing voltage taps quickly without the need of tools. Jefferson Electric Co., Bellwood, Ill.

Exhaust Fan

A line of multi-blade two-speed exhaust fans ranging in size from 16-in.

up to 30-in. Totally enclosed, self-cooled motors are featured as being protected from dust, grit, grease and fumes, and requiring lubrication only once a year. Heavy-gauge steel mounting rings are provided with four drilled holes, for easy installation of the fan unit. Wire guards or automatic louvres are available for all standard fan sizes. Wagner Electric Corp., St. Louis, Mo.



Many-Purpose Pulling Tool

A compact tool for hoisting, pulling or other heavy jobs where space or head room is limited. It is made in ¾, 1½, 3, and 6-ton capacities. Known as "Pullift," it has been designed for quick one-man operations where light weight and ease of operation are necessary. A ratchet lever is used which permits short strokes of the handle at any point in a complete circle. Direction of hook travel is governed by a pawl that is controlled on the handle grip. A self actuating brake is said to eliminate handle whip. Yale & Towne Mfg. Co., Philadelphia, Pa.

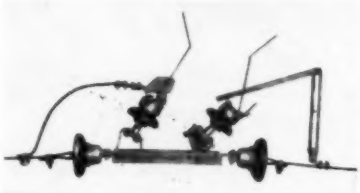
Adjustable Machine Lamps

No. 16 Fostoria Machine Lamps are for industrial sewing machines and other machines which require adjustable localized lighting units. The reflector is made for 15 or 25-watt lamps, and is mounted upon a ball-and-socket jointed arm assembly that is claimed to give maximum flexibility yet maintain a rigid position under severe shocks and machine vibration. A drilled base is provided for bolting this unit to the machine. A special clamp is also available which eliminates drilling machinery frames to fasten the

lamps. Fostoria Pressed Steel Corp., Fostoria, O.

Line Sectionalizing Switch

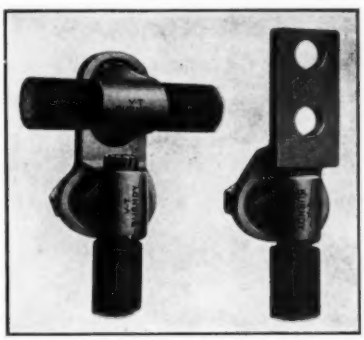
S & C type RT Horn Gap switches for sectionalizing rural transmission lines, are made in 1, 2, 3 or 4-pole units. Sleet hoods are provided to protect the floating type contacts. A 6-point high pressure positive contact is claimed for this line, also ease of mounting, and universal contact joints on the "grasshopper" for angular connection of live wire. No braided jumper connection is used. Made in 200 amps., 7,500 to 34,500 V., and 400



amps., 7,500 and 15,000 V. ratings. Schweitzer & Conrad, Inc., Chicago, Ill.

Solderless Connector

The V-line of cable connectors employs a U-bolt clamping element designed to accomodate a wide range of cable sizes without injuring the cable strands. Made of Durium copper alloy, they are said to resist seacoast and corrosive industrial



atmospheres, while having an ultimate tensile strength greater than steel. For use with conductors ranging from No. 8 stranded to 2,000,000 c.m., and such forms as: T, lug, coupler, reducer and stud connectors. Burndy Engineering Co., Inc., New York, N. Y.

Hand Hoists: A folder describing "Pul-Lift," a line of ratchet-operated hand hoists for one-man lifting or pulling jobs in close quarters. Yale & Towne Mfg. Co., Philadelphia, Pa.

Conduit Fittings: A revised edition of catalog No. 10 lists threaded and no-thread Unilets, also the Form 35 line of Unilet fittings. Appleton Electric Co., Chicago, Ill.

Wood Bits and Screw Drivers: A complete line of wood boring tools and screw drivers is covered in Catalog No. 36. The Irwin Auger Bit Co., Wilmington, O.

Appliance Repair Statistics: A promotional folder giving statistics regarding electrical appliances that are in use, and those in the age brackets that need repairs. The Ohio Carbon Co., Cleveland, O.

Wiring Devices: A 66-page wiring device catalog covering 37 major subjects of devices, arranged in twelve sections. General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

Electrical Connectors: A 48-page catalog No. 33-C covering the Burndy line of connectors in copper and aluminum for cable, tube, wire, bar and rod. Burndy Engineering Co., Inc., New York, N. Y.

Stator Winding Tools: Bulletin 50, 8 pages illustrates and describes service shop tools, including a "gun" for winding small stators, and overhung stator winding vise and turn counter, internal growlers, and other accessories. P. E. Chapman Electrical Works, St. Louis, Mo.

Wiring System Manual: The G-E Radial Wiring System for residences and other small buildings is diagrammed and fully explained in a 28-page reference manual for architects and engineers, publication No. 51-611. Design procedure; a comprehensive check list; suggested specifications; a table of materials for service entrances and general light and power circuits; and supplementary data regarding underfloor fiberduct systems and general schedule materials, are included. General Electric Co., Appliance and Merchandise Dept., Bridgeport, Conn.

Classified Advertising

Position Wanted: Engineer and estimator desires position with contracting concern. Twelve years' experience as estimator and engineer for New York contractors. Technical graduate, licensed engineer, specializing in large public and industrial installations. Can do sales work if desired. Very reasonable salary. Will accept part time work. Details upon request. Box 41, ELECTRICAL CONTRACTING, 330 West 42nd St., New York City.

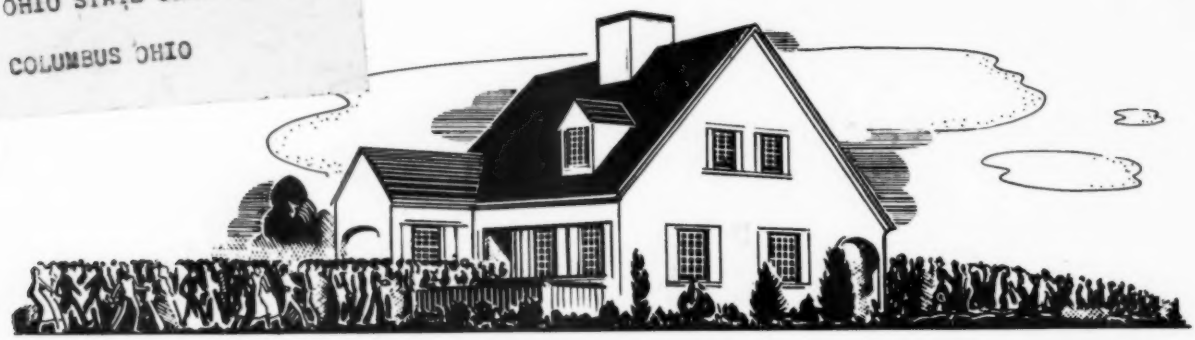
Advertisers' Index

H & H INDUSTRIAL SOCKETS

—*with* Red Key and gray insulating enamel

These features set the Red Key sockets high above the ordinary. Threaded catch shells finished with *gray insulating enamel.* Gray porcelain interior, extended to form a bushing or bearing for the key (see insert view above). Brass shell cannot cut into the key stem. Heat-resisting lining encloses the porcelain interior. Furnished with usual female thread caps, also pendant and cord grip caps. Complete listings in catalog data-sheet, on request.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD. CONN.



3,000,000 VISITORS!

More than 3,000,000 men and women have visited the hundreds of "New American" Homes which the General Electric Company has sponsored in order to demonstrate the economy, convenience and comfort provided by complete electrical equipment. Well-designed, *complete* wiring systems serve this equipment. The visitors have been shown the ways in which this adequate wiring enables the family to enjoy more fully their lighting, appliances, air-conditioning, oil burner, etc.

Thousands of electrical contractors will be able to convince prospects to install *better* wiring systems because these people were impressed by the benefits of adequate wiring when they inspected the "New American" Homes! And many more "New American" Homes will be constructed throughout 1936 — more visitors will surely become better prospects for contractors.

This is only one way in which General Electric is helping electrical contractors to sell more wiring. You should be interested in a few of the additional methods, which follow, because these also demonstrate wiring promotions on which contractors can capitalize.

1 G-E engineers originated and developed the G-E Radial Wiring System — designed to give owners of homes and other small buildings more efficient use of their electrical equipment, to reduce voltage losses for them. G-E Radial Wiring calls for an average expenditure of 3¼ per cent maximum of the building dollar—yet this wiring system has such clear-cut advantages that the majority of people who are building will readily pay the additional amount! Thus you, the electrical contractor, obtain a bigger job!

2 General Electric monthly spends many thousands of dollars in advertising to educate home owners, architects and operative builders, commercials and industrials, to the benefits of adequate wiring systems. This advertising states: "Don't skimp a few dollars on the wiring when these dollars will bring more comfort than will any other expenditure of the same size made in the home!"

3 General Electric has backed the Federal Housing Administration's "Rebuild America" drive by helping to prepare the "Rewire America" program for electrical contractors — and by extensive advertising urging the public to install wiring and electrical equipment with the help of the liberal FHA modernization and new construction financing plans.

4 A vice-president of the General Electric Company delivered the first nationally broadcast radio address which specifically urged home owners to install *more adequate* wiring systems — and he told his listeners to consult at once with their local electrical contractors in order to get this work done!

5 For seven years General Electric has published a magazine which describes and suggests profitable *merchandising* methods for contractors.

The General Electric Company believes that these examples demonstrate the type of constructive merchandising job which can help the electrical contracting industry to increase its share of the building and modernization dollar.

GENERAL ELECTRIC

APPLIANCE AND MERCHANDISE DEPARTMENT. GENERAL ELECTRIC COMPANY. BRIDGEPORT. CONN.